The Builder.

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*Works in Iron.**

R. MATHESON, a member of the firm of Andrew Handyside & Co., of Derby, says in the book he has published, with the above title, dated January, 1873, that it is almost certain that there will be a reaction downwards from the high prices of iron which have ruled through the year 1872, but that it is hardly probable that the low prices of 1869, even if reached at all, will ever long prevail. The constantly - diminishing purchasing value of gold is apparent in the iron trade, as elsewhere; and as not only the price of fuel and the rate of wages have risen, but the hours of labour have been reduced, there are many elements at work to keep up prices; although against these there must be placed the economies that may be obtained by improvements in machinery, new methods of working, the competition of an increased number of ironworks, and by fluctuations in the home and foreign demand.

When the hot-blast was introduced in Scotland, forty years ago, the quality of the iron made by that method was greatly reduced; so much so, that it has since been customary to require iron to be made by the cold blast wherever a good quality of iron has been required; but now the iron-makers claim to have so improved the system of working and applying the hot blast, that the difference in quality between iron so made and cold-blast iron is, they say, greatly lessened, and is practically of no effect for most purposes. Several qualities of iron may be produced by either system from the same smelting-furnace, and with the same materials, according to the proportion of fuel used in the operation of smelting; thus, when the fuel used is in large proportion to the burthen, soft, tough, grey iron is produced; but when the quantity of fuel is diminished to its lowest point, hard, brittle, white iron is the result.

To judge of the quality of cast-iron from an inspection of a fracture requires considerable experience and skill, and can hardly be taught except by experience. The following description of the various kinds of cast-iron may, however, form a useful guide. No. 1 is the production of the furnace when charged with a large quantity of fuel in proportion to the quantity of ironstone. This iron is the most slowly made of all the descriptions of pig-iron, and contains a larger proportion of carbon in chemical combination or mechanical mixture than any other quality. It is the most fusible pig-iron, and most fluid when melted, and is used for small and delicate castings. The fracture of this quality of pig shows a dark grey colour, with a high metallic lustre; the crystals are large, many of them shining like freshly-cut lead. However thin this metal may be cast, it retains its dark grey colour, if of good quality. No. 2 is intermediate in quality and appearance between No. 1 and No. 3. No. 3 contains much less carbon than No. 1. The crystals shown in a fracture of this iron are smaller and closer than in No. 1, but are larger and brighter in the centre than near the edges of the fracture. This iron is capable of being made sufficiently fluid for large castings. A mixture of a proportion of No. 2 with this improves it. The colour is a lighter grey than No. 1, with less lustre. No. 4, or bright iron, has a light grey fracture, and but little lustre, with very minute crystals of even size over the whole fracture. It is the "leanest," or contains less carbon, of any of the grey irons. It is not fusible enough for foundry purposes, but is used in the manufacture of wrought-iron. It is the cheapest of the grey irons. When inferior in quality there is usually a thin coat or "list" of white iron round the edges of the fracture.

Mottled iron is intermediate between No. 4 and White, the fracture being dull dirty-white, with pale greyish specks, and with a white list at the edges. White iron is the worst and most crude, being hard and brittle; the fracture is metallic white, with but little lustre, and not granulated, but having a radiating crystalline appearance. This iron, says the author, is largely used in the manufacture of inferior bar iron.

Where specially severe service is required of cast-iron, special tests are required, as in the case of railway chairs, where the test of a weight falling on the casting resembles in some measure the heavy and sudden shocks of passing trains; but for ordinary purposes the test is the transverse strength and elasticity of a beam. A convenient size for the bar to be tested is 3½ ft. long, 2 in. deep, and 1 in. broad, placed on bearings 3 ft. apart, and loaded on the middle until broken; but as considerable power of cohesion may be attained in alliance with extreme hardness and brittleness, it is necessary also to measure the deflection which occurs, and thus to ascertain the elasticity and ductility of the iron. If a bar made of twice-melted iron—*i.e.*, iron first made into pigs from the ore, and then re-melted—be subjected to this test, it will be found that the weights necessary to break bars of this size made from the same kind or No. of iron will vary from 2,300 lb. to 3,500 lb., according to the locality from which the ore is obtained; and if made from mixed irons, from 2,700 lb. to 4,300 lb.; and that the ultimate deflections before fracture will vary from two-tenths to five-tenths of an inch. These wide differences in the quality of the same kind of iron from different localities cause corresponding differences in prices. Some of the Derbyshire and Yorkshire irons are generally sold at higher rates than the average, while some of the Middlesbrough iron is of a very inferior kind, although by judicious mixture of the local ore with other and better sorts a good standard may be reached.

The hematite iron found in different parts of Cumberland and Lancashire, and elsewhere, is of a peculiarly tough nature, which renders it very valuable for mixing with other kinds. Almost all kinds of pig iron are improved in quality by mixing with other sorts, but in those cases where the cost per ton is the only consideration the lowest price for castings will of necessity be obtained from those founders who use the cheapest iron, and who do not incur the expense of buying and carrying to their premises more expensive kinds for mixing with it. The cheapest castings are, in some cases, not made from pig iron at all, but directly from the ore-smelting furnaces. A large proportion of the iron castings supplied for building purposes in this country are made without any reference whatever to the quality of the iron. It is often the case that an increase in the dimensions is supposed to compensate for inferiority of quality, but beyond a moderate thickness cast iron becomes spongy or open. A hollow column, 1 in. thick, for instance, will not be doubled in strength if made 2 in. thick.

The price of different sorts of iron varies considerably, but the cost of labour and of transport are the same for all, and pig iron of a lesser cost and proportionately lower price will, when made into a casting, show an inferiority more than proportionate to its low price; thus a saving of 25 per cent. in the cost of the raw material will be reduced to 10 per cent., or even less, in the finished casting, which still preserves its inferiority in quality of 25 per cent. It would be an advantage, therefore, if specifications of ironwork were given with greater distinctness and more often enforced. A strength capable of enduring 25 cwt. on the test-bar without fracture should be the minimum quality allowed, even for short and heavy columns; but for other purposes, a load of from 28 cwt. to 30 cwt., and a deflection of five-sixteenths of an inch, should be demanded. The deflection will vary from three-tenths to five-tenths of an inch. There is no difficulty, says the author, in getting such iron, and higher qualities can be given if necessary, breaking strains of 30 cwt. to 35 cwt., being obtainable with judicious mixtures of the best kinds of iron; and in testing such iron it will generally be found that some of the bars will endure as much as 38 cwt. In the minds of those who are not aware of the great differences of quality that have been referred to, the numerous accidents and risks that often attend the use of cheap metal, have created a prejudice against the use of cast-iron altogether; and many people, considering it to be without elasticity, avoid it wherever wrought-iron can by any means be used instead. This is the more to be regretted because cast-iron allows infinite variety of shapes, more nearly approaching the exact forms and sizes required by design or strength than is possible with wrought-iron; and for many situations cast-iron is even stronger and more enduring.

Wrought-iron, like cast-iron, when put into large dimensions, is not so strong per square inch as smaller sections, when well made, because of the greater amount of working the smaller sizes undergo, but sometimes the method of rolling iron into peculiar sections causes lamination on some of the parts, which renders the iron not everywhere equally strong or elastic. From this it arises that from certain sections, where the iron is afterwards heated in the fire or worked on the anvil, it is difficult to produce the shapes that may be required without burning or cracking the iron.

Great uncertainty in the quality of iron has usually been caused by the manner in which the specifications have been given, as "Best," "Best Best," "Best Staffordshire," and so far as these words distinctly implied a certain quality they were sufficient; but as the B. of one district was equal, perhaps, to the B. B. of another, and the terms thus conveyed a conventional and rather uncertain meaning, at last it became necessary to indicate the really best quality as "Best Best Best." It is now thought expedient to avoid such phrases, and to state distinctly the strains and tests to which the iron shall be equal.

If notoriously cheap and inferior sorts be omitted, wrought iron may be obtained in the open market to sustain the following strains, and respectable manufacturers of bridges, roofs, and other iron structures may be expected to use such iron without express stipulation. Square, round, flat, and L bars will endure a tensile strain of from 20 to 24 tons per square inch before breaking, and 20 tons should be considered the minimum. T bars have about the same strength, but, owing to the manner in which they are rolled, it is in some other respects inferior to L and simple bars.

* "Works in Iron." By Ewing Matheson. E. & F. N. Spon. 1873.

Plates, as a rule, are not capable of sustaining such a high degree of tension as bars made from the same quality of pig-iron; and from 18 to 20 tons may be taken as their breaking-strain. As the breaking-strain of a number of bars purchased together will vary, a specified minimum breaking-strain implies an *average* strength of a higher figure, and, for iron of fair quality, this average may be taken as about 22 tons for bars and 20 tons for plates.

The limit of elasticity, rather than the ultimate or breaking strength possessed by a piece of iron, determines its value for structural purposes. With a strain of 10 or 11 tons per square inch of section an elongation of a hundredth part of its length takes place, and the quality of the iron should be such that when this force is withdrawn the bar will return to its original length. If the iron is stretched beyond this point, the rate of elongation increases, and a permanent set takes place,—*i.e.*, the bar will not entirely recover itself after the strain has been withdrawn. For determining the quality of wrought iron, apart from its mere breaking-strength, the fact that it can be bent cold to a certain angle without damage will show its toughness. A plate ½ in. thick, bent to an angle of 35° without damage will, if it possesses sufficient breaking-strength, afford, for ordinary purposes, a satisfactory proof of its elasticity. Some kinds of wrought iron will bend to a much greater angle than 35°. Lowmoor iron will bend nearly double without breaking. The iron from which rivets are made should be of a better quality than ordinary bars, and its ductility should be such that it will bend double when cold without cracking.

Although the price of iron fluctuates, the relative prices of the different shapes at any one time are about the same. Assuming that the price for plates is 12*l.* per ton, ordinary flat and round bars may be purchased at 10*l.* to 10*l.* 10*s.*; L irons at 10*l.* 10*s.* to 11*l.*; and T irons at 11*l.* to 12*l.* per ton. But for L and T irons of a section whose total dimensions exceed 8 in. (that is, exceeding 4 in. by 4 in., or 5 in. by 3 in.), and for bars over 6 in. wide, extra prices are charged.

Joist iron I, and channel iron ⊔, of small sections, up to about 7 in. in depth, may be obtained at about the same price as T iron, but with larger and wider sections the price rapidly advances, so that with a depth of 12 in. or 14 in. a price of 15*l.* is reached.

Bars of all kinds may be obtained in lengths of 20 ft., 30 ft., and even 40 ft., according to their section; but when a weight of 4 cwt. is exceeded, extra prices are charged. Plates can be obtained of any size up to 24 square feet area, if not exceeding 4 cwt., without extra price, but the increase in price is not very great up to 8 cwt. Thin plates of large area cannot be rolled.

As cast-iron resists a compressive strain with six times the force with which it is capable of resisting a tensile strain, it has been usual to follow Hodgkinson's rule of making the sectional arc of the bottom flange of a girder six times as much as that of the top flange, but it may be considered that the strength of a beam ought not to be determined by its resistance to fracture, but rather by its resistance before the limit of elasticity is reached, and the proportionate resistance of cast-iron to compression and tension in this case is only three to one. Assuming three to one as the proportion to be adopted, the section of the girder should be so arranged that its centre of gravity is at a point three-fourths of its depth from the top; that is to say, if the total depth of the girder be divided into four parts, the quantity of metal in the lower fourth part should be equal to that of the upper three parts.

Irregularity of thickness of metal in castings tends much to reduce their strength, for the thick part takes longer to cool, and draws towards it the thinner part which has already cooled, and which cannot yield without being strained; and if such castings are afterwards subjected to percussion, they may break. The shrinkage in dimensions from the molten to the cold state is about an eighth of an inch per foot.

For wrought-iron girders, the plate-girder is the most simple, and, up to a certain size, the most economical. It is rigid and durable, and is the most appropriate for small spans. Where great rigidity and strength are needed, two web plates are sometimes employed, thus enclosing a space, and making what is called a box, or tubular girder. This enables wider flanges to be used, and makes a much stronger beam. It is, however, necessary that the inside of the girder shall be spacious enough to give access to the painter's brush, as it is liable to rust, and consequent deterioration, if unpainted. When the exigencies of a design render small box-girders necessary, special precautions should be adopted to prevent deterioration by rust. The iron should be allowed to rust, and should then be well scraped and coated with bituminous paint. Rolled beams are sometimes used with advantage instead of plate-girders of small depth. They are especially suitable as joists for fireproof floors, as rafters in iron roofs, &c. They are made from 4 in. to 14 in. in depth for general use, but for special occasions they have been made as much as 3 ft. in depth; nevertheless, it may be said that, for a greater depth than 10 in. or 12 in., a plate-girder is preferable to a rolled beam.

Deterioration of iron-work is rapid when the proper painting is neglected; the flakes or scales of rust which fall from wrought iron of course weaken its structure in proportion to the entire thickness of the iron, and this proportion is considerable in the case of plates ¼ in. to 1 in. thick. With wrought iron girders and joists sustaining, as they often do in warehouses, immense loads, the risk of ultimate disaster through this cause is considerable.

When iron-work is completely imbedded it is preserved from rust, and it is said that in cathedrals and other ancient buildings, iron-work has been found which has kept in good condition for 600 years. This, however, and the effect upon it of lime or cement, requires further investigation.

In the process of casting iron, the molten metal fuses the sand upon the surface of the mould, and produces on the casting a skin which has the appearance of a silicate, and which is much harder than the purer iron within. This skin is of value in giving a hard, smooth continuity of surface to the iron; and as it would, if allowed to rust, soon be destroyed, it is desirable to protect it by paint. A casting, therefore, should have a coat of oil or paint as soon as possible after it leaves the foundry, and before any oxidation has commenced. A second coat of paint should soon afterwards be added, and then the original surface of the iron may be permanently preserved by occasionally painting, from time to time, as required. Whether one year or five years elapse before fresh paint is wanted depends upon the weather and climate, and the kind and quality of the paint. If rust does appear on a casting, it should be carefully scraped off before the paint is applied. Upon the surface of wrought iron a skin is formed during the passage of the heated bars or plates through the rolling-mill. This skin, unlike that upon cast iron, is not inseparable from the solid metal, but forms a scale which can be detached. It is a chemical combination of iron with oxygen, the proportion of the latter increasing as the iron is exposed to the air, until it produces peroxide, or rust. But the elements of rust are on the iron from the commencement. The scales must fall off sooner or later, and in a manner entirely unlike the granular rust of cast iron. The thin skin or scale which forms on new wrought iron is of no value, and it must fall off or be removed before the real iron is reached. When the iron is galvanised, it is necessary to remove the scale before the zinc will adhere to the iron, and this is effected by a process of "pickling," the iron being first dipped in dilute acid to remove the scale, and then washed in pure water.

This is occasionally exacted in very strict specifications of wrought-iron work intended to be painted, but somewhat the same results may be obtained by allowing the iron to rust, and then scraping off the scale preparatory to painting. If some rust remains on the iron the paint should not be applied lightly, but by means of a hard brush should be mixed with the rust. When iron structures are sold for delivery only, one coat of paint is included in the price, and if the iron-work has to be erected also, a second coat after it is fixed is also included. When more than this is required it should be stipulated in the contract. For bridges, roofs, and similar structures, three or four coats should be given in all. As a general and approximate rule, 2d. to 4d. per square yard, or 3*s.* to 5*s.* per ton on the weight of ironwork, may be taken as the expense of each coat of paint after the first.

Numerous examples of executed bridges and roofs are given in Mr. Matheson's "Works in Iron," and the means and cost of erection, besides the fundamental principles of construction to which we have referred, and altogether the book will be very useful to architects and engineers; and the vocabulary of French and German equivalents of English technical terms which is appended will render the book particularly valuable to those going abroad.

FLOOD, FEVER, AND LOCAL GOVERNMENT.

THE British rainfall of the winter of 1872-73, which has exceeded by one-half the average depth, has read a lesson to some parts of the country which they will be slow to forget. It is one of the most odious characteristics of humanity to rejoice in the occurrence of evil because its prediction has been verified. We trust that we need not disclaim such a disposition. It is not for our own gratification, but for the public service, that we take the occasion of the long-continued floods in Somersetshire to insist anew on the importance of a central and scientifically directed investigation of the great national question of water-shed, water-supply, and water-conservation.

In December and January last (and the subsequent rainfall has been such that we may almost now use the present tense), 150 square miles of the low-lying lands in Somersetshire were permanently inundated. Some accounts give a much larger area to the mischief. In Langport, the cellars, streets, and living-rooms were flooded, and many villages were permanently isolated. Mr. Neville Grenville, acting on behalf of the Sedgemoor Commissioners of Sewers, brought these facts before Mr. Secretary Bruce, and used the expression, "the present plague of waters cannot be exaggerated."

The question of neglected hydraulic engineering has in this instance assumed an economic importance to which possibly some small degree of attention may be afforded by the Government. Indeed, we are told that the Government promised to send to the spot, *at the expense of the inhabitants, under a personal guarantee*, a gentleman who was one of Mr. Brunel's resident engineers on the Cheltenham and Great Western Railway. As to the sanitary part of the matter, the truncated legislation of last year has produced its natural result; that is to say, *nil*. "Ague is prevalent," writes an inhabitant of Sedgemoor. "My daughter and niece are suffering from it now; when the waters subside, fever will doubtless follow. It is idle to appoint medical inspectors, if such a vast fever bed as Sedgemoor is to remain untouched."

It is discovered that the Land Drainage Act of 1861 does not give power to any one to do anything efficient in this case. Sedgemoor, however, is but one instance out of many. The valleys of the Parret, the Brue, the Ile, the Yeo, the Tone, and the Axe, are all in a state of confluent flood. There are large inundations in other places where Commissioners of Sewers have jurisdiction; but everywhere they are nearly powerless to initiate any necessary works, even in cases of extreme urgency.

It is proposed to hold a public meeting at Bridgwater, so soon as Mr. Grantham has completed his report. A remarkable feature of the case is, that no attempt seems to be made by any of the sufferers to derive any advantage from the sanitary measures of 1872. The formation of sanitary districts was the one expedient which survived out of the original Bill. And yet we find the old Sewage Commissioners appealed to, the inefficiency of old legislation deplored, and the sufferers applying,—not to the Local Government Board, but to the Home Office! A more cruel satire on the administration of the sanitary measures cannot be imagined. Here are thousands of people flooded out, hundreds of square miles under water,—and no one seems to have any idea that it is in the charge of any Minister but the Home Secretary, who offers the luxury of a report—at their own expense!

There can be no doubt that a great national question is here paltered with in an inexcusable manner. It is not creditable that our Government shows such supineness where both the health and the wealth of great districts of the country are involved. There is not even the paltry excuse of economy. The equation showing how many human lives ought to be sacrificed, in order to effect a saving of 100*l.* in the Budget of the year, is one that we have not yet seen fairly worked out. Probably the Chancellor of the Exchequer and the head of the Local Government have elaborated the *formula*. We shall be

glad if one of our friends will put the question in Parliament. We hesitate to venture any guess as to the unit of value that may be adopted. How many lives go to a pound? In some districts, perhaps, a negative value is attached to the former quantity. In that case it will be a grand stroke of political economy at once to diminish the population, and to reduce the nominal expenditure of the nation. If that rule be established, we do not see where its application will meet a limit. It will be of use all round. The policy of "do nothing" will receive its most complete support and appropriate development. First there will be the usual result of saving trouble and Parliamentary responsibility to the Minister. Parliamentary responsibility,—for what has public life to do with such figments as conscience? It is not a question whether a few hundred people shall or shall not be carried off by fever. "Thou canst not say I did it." Our legal institutions are not such as to admit of any trouble being given to any one on such a mere theoretic question as that. But the actual, odious responsibility is this. The honourable member for Screwemtight will give notice that on such a day he shall put a question to her Majesty's Government, regarding the waste of public money lately involved in making an altogether uncalled for inquiry into the health of a certain district. Such a matter, the mover would prove, had none but a sentimental interest. It was entirely confined to a few hundred inhabitants of the district in question. The great law of supply and demand has, on the present occasion, supplied the deficient quantity of water for which there was such a vociferous demand a summer or two ago. If such a supply was attended by ague and fever, these were mere natural phenomena, with which enlightened legislation had nothing to do. The inhabitants were perfectly free, as far as legislation is concerned, to leave the district if they disliked such phenomena. If they did *not* leave, it proved that they preferred remaining. No one had a right to interfere with their choice. They were in all probabily, many of them, members of the "surplus population." If otherwise, and if fever carried off so many as to raise the price of labour in the district (the only practical evil), surplus labour would soon flow in from other districts, and restore the natural level. In fact, fever and ague are among the beneficial agencies of nature, as reducing surplus population.

Against arguments such as these we know that it is of but little avail to raise our voice. We do, indeed, venture to think that of all the produce of Great Britain that which is at the same time the most costly to rear, and the most valuable when reared, is human life. We are prepared to support that view by facts and figures, though we shall only be sneered at by certain persons.

But apart from that,—apart from the "sentimental" view, that the effect of a single outburst of fever, thoroughly preventible and totally unprevented, may have a terrible effect on human life; apart from that great responsibility as to which,—being only moral, and not Parliamentary,—the Minister is content to shut his eyes; we have a word to say which should, even now, claim attention. We speak in an authoritative tone. We will use the magic phrase before which, in the country of Cervantes, all doors fly open,—"*de la part du Roi*,"—we invoke the name of King L. S. D. What a terrible waste of something so much more valuable in some estimates than mere human health and life is involved by giving up these fertile valleys to the occasional ravages of floods, and to the permanent invasion too often of reeds and rushes and bog-growing vegetation!

The great check to the fertility of this country is to be found in the uncertainty of the seasons. Or, we may say with greater precision, in the unqualifiable neglect of our agriculturists to take such measures as are demanded to make the best of that uncertainty. No attempt has been made, on anything like a systematic plan, to average our ample and abundant rainfall. We do not store the heaven-sent treasure, as people in more thirsty lands have long been taught to do. We not only give no heed to facilitate the discharge of the waters when they reach the lower levels of the natural drainage districts, but we throw obstacles of all kinds in the way of the outlet which the physical character of the country has afforded from Saxon times. Mills, weirs, water-rights of all kinds are allowed to exert a prescriptive energy in drowning our most fertile river valleys.

The question of irrigating the high-lying and waterless districts is one involving cost, time, and much intelligent investigation. But the question of freeing the natural outlets from artificial obstructions, is far more simple; and, to return to our present argument, it is self-supporting. Five tons of rich meadow hay per acre may be obtained from well-watered, but unflooded, land in any part of England. We are not putting this as a theoretical possibility, but as an outcome of actual experience; and, in the cases cited, it is not said how much area of land is actually wasted by the barbarous system of water-carriers generally adopted. In those water meadows which raise heavy crops in a season elsewhere grassless, how general is the presence of flags and rushes, the evidence of wasted area and diminished swathe.

We might go further if we point to the industry of Lincolnshire, of Norfolk, and of Holland; and to the laughing crops raised below the level of high water. But we are confining our attention at present to that simple amount of security which is to be attained by the simplest procedures of the engineer, and which will immediately recoup the outlay. And we throw in the health and vigour of the inhabitants of the districts that cry out for this attention gratis, because we are as yet waiting, as before intimated, for the solution of the equation; 1*l*. = *x* human lives, to find the value of *x*.

Confining our attention for the moment to England and Wales alone, we have to point out that this area constitutes some eight or ten grand natural watershed districts. Physically, or according to the character of the rivers, they may best be divided into eight; but the size of two of the areas thus marked is so great as to render more feasible a division into ten. Each of these districts is enough to occupy the full attention of a civil engineer of the first eminence in his profession. The general course of the waterflow in the district, from the high lands where the rainfall is parted, to the ultimate escape into the sea, should be carefully studied, attention being paid at the same time to the physical and to the geological structure of the country. No large amount either of cost or of time would be required, in order to enable these engineers to arrive at such a perfect knowledge of the details of their respective districts as to be able at once to give good and sound advice as to the leading conditions of any public work or private work of magnitude projected within the area in question, in so far as it affected or was affected by the course of rainfall and of drainage.

The amount of public time that would be saved, and of public convenience that would be attained by a systematic division of the country into engineer districts such as we suggest, with a resident engineer appointed to each, would be incredible. As it is, when any great work is proposed, not only must a special study be made by, or on behalf of, the proposer, but an independent study has to be made by every opponent, or by every one whose interest is, or may be, affected by the proposed operations. Not only so, but legislative sanction has to be obtained. If this is made a mere party question; if the sanction or the rejection of a Bill is to be a mere matter of personal influence, irrespective of the merits of the case, we have nothing to add. But if ever we should arrive at the time when it was thought right that the action either of the Legislature or of the administration of the country should be directed by intelligence; if we can conceive it possible that the real value of any engineering proposal had to be weighed by a committee which inquired into the real merits of the case,—then the function of the district engineer would become one of evident importance. A few hours given to the exposition, by such an officer, not of his own opinion of a measure, but of the actual facts of his district, and of the mode in which the proposed measure was accommodated to those physical facts, would save weeks and weeks of dreary battling in committee; where the acumen of the examining counsel, or the adroit cleverness of a witness, is the element that determines the verdict,—at least, when that is not mere matter of foregone conclusion and counting noses.

It is tolerably evident that the time has not yet arrived in which sanitary and economical reformers can cast the burden of their cares upon a sympathising and intelligent Government. But we are sure that the lasting gratitude of the people of England will follow the name of that Minister,—whatever be his political hue,—who shall first deal with the great sanitary and economical question of the water circulation o the country on none other than sanitary and economical principles. A good occasion has been lost, but it is seldom too late to mend.

ON THE LAYING OUT OF CITIES.*

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

When we turn our thoughts to the antique past, stimulated by the fact that, from the earliest ages, various large cities have existed, we must expect to be disappointed in obtaining any complete idea of their formation and arrangement, because their remains are so small, and contemporary notices of them so vague; indeed, it is almost a waste of time to seek satisfactory information concerning them. That they were enclosed by walls, and possessed fine public buildings ranged principally around a large open space, a campus, agora, or forum, is about all that we can with certainty assert. Pompeii, which bore somewhat the same relation to Rome and Naples that Brighton does to London at present, remains in a partly perfect state, and affords us some idea of what a populous and fashionable seaside town was under the earlier Roman emperors, and in the most civilised country of Europe, and certainly the impression is not a very favourable one. It is a very suggestive fact, and one that we should bear well in mind, that not a single city remains at the present day to give us the model of what a city was some two thousand years ago. Will the same remark hold good some two thousand years hence? We have every reason to think so; and the cities of the future will be as different to the cities of the present as the cities of the present day are to those of the past. Is that difference great? We can answer at once and with certainty, it is enormous, it is almost incredible! One great cause of that difference is, that there was in ancient times no middle class, only masters and slaves. Amongst the ancient Romans, even the liberal professions were held fit only to be practised by slaves. There was a grand priestly and aristocratic luxury,—a mean, squalid, general poverty. With the advance of the later Roman empire came also an advance in the conveniences of life; but art itself declined, and with the fall of the empire, the art of building cities fell also; then the dark ages settled over Europe. Throughout this period, or from about the fifth to the eleventh century, many new cities and towns arose throughout Europe, of which the royal residence, the church, or the castle formed the nucleus, surrounded by walls, within which all was narrowness and filth: nor is this to be wondered at, when we remember that the greatest people of Europe during this period used their fingers to eat with, and thought it no mean accomplishment to be able to write their own names. Luxury, sanitary provisions, and even comfort were unknown, except amongst the great nobles and the higher clergy. But why did the dark age people build such close, pent-up towns? Land was not dear, as it is now; and they might have had spacious streets, tree-planted areas, parks, and so on. The reply is, that they had no idea that system and art ought to enter into the arrangement of a town. They probably did not think about it at all; they did what their fathers had done before them; they followed precedent, and the principal precedents of the West were derived from the East. The Mahomedans of the eighth and succeeding centuries were to the world what the Christians became at a later period, the first in arts and arms. Europe was their pupil, and followed closely their example. Life with Orientals was then an incessant warfare against two enemies, the sun and their fellow-creatures; so that when men congregated together, they sought to keep out both in the best way they could, raising strong walls against the one, and forming narrow streets against the other: thus they enjoyed the comfort of coolness, or at least of shade, and the comfort of a sense of security; beyond that they appear to have had no particular ideas. The plan of many such towns is preserved even to our own day, of which Albenga, on the Riviera, is an interesting example; a sort of large prison, intersected by narrow and tortuous passages, tending to keep out sunshine and fresh air. Life must have been very dreary within so dark and confined a space. So things went on

* From a paper by Mr. J. B. Waring, Fellow, read at the ordinary general meeting, held on Monday, the 31st of March.

in the same fashion, over and over again, into the semi-opaque or Middle Ages; and Mr. Hudson Turner, in his most valuable work on the "Domestic Architecture of England," speaking of London in the thirteenth century, when its population was under 20,000, remarks that "as to the appearance of the City, we shall not perhaps be far wrong in assuming that it presented the aspect of a mass of low whitewashed tenements; the plasterers' brush appears to have been unsparingly employed, to give a cleanly exterior to the dwellings of the Londoners"; but if the outsides were clean to the eye, the interiors of the cities must have been often filthy. "In the principal thoroughfares," says Mr. Turner, "it is evident there was some kind of foot pavement, though the roadway appears to have been frequently left to its chance; and the streets leading down to the river, which offered the means of a natural drainage from the upper and more level parts of the city, had usually open drains flowing through them, the effect of which was to maintain them in a continual state of mud." Even in the great hall itself at Westminster, the refuse and dirty water flowed in an open kennel through it, until the foul odours arising therefrom" led Henry II. ordered the construction of a "subterranean conduit" to convey the "offensive matters into the Thames"; and this, Mr. Turner thinks, is perhaps the earliest instance of underground drainage in this country. But to return to the more immediate subject in hand, we come at last to a glimpse of a better state of things in the reign of Edward I., who, from one cause or another, founded completely new towns, which were often called in France *villeneuves* (new towns) or *villefranches* (free towns). Mr. Turner informs us that "the inhabitants were all made free men, exempt from the power and jurisdiction of the neighbouring barons or bishops; their tenure was direct from the Crown, and they were granted the important privilege of free trade." Here, for the first time, so far as we know, in the history of cities,* we come to a clear and definite system of arrangement; and it appears probable that this system is due to Englishmen, since Mr. Turner gives an extract from an original document in French, wherein Edward I., anno 1298, wrote from Bordeaux (then the capital of the English provinces in France) to London, "desiring the authorities there to send him out four persons competent to lay out the plans of towns, who best know how to divide, order, and arrange a new town, in the manner that will be most beneficial to us and for the merchants." Alfonso, of Poitiers, coming to the Duchy of Guienne, about the same period, finding the nobles and higher clergy quite independent of him, also founded free towns, such as Rovergne and Agen, the last of which is still in a pretty perfect state. Edward founded Sauveterre, Monsegur, La Linde, Saint Foix, Libourne, and Montpazier, in France; and Kingston-on-Hull and Winchelsea in England, all formed on a general plan, of which Montpazier will serve as a good example, and fully described by Mr. Turner, from which we give the following extracts:—"These towns are more regular and symmetrical than most modern towns, and are built on an excellent and scientific plan. . . . . There are always two parallel streets at a short distance from each other, and connected by short streets at frequent intervals; between these principal streets, and in parallel lines, are narrow streets or lanes, corresponding to the modern mews, and employed for the same purpose. By this means each plot of ground for building on is of a uniform size and shape, a parallelogram, with one end facing a principal street, and another a lane. . . . . The principal streets were 24 ft. wide, the lanes 16 ft., and the passages only 6 ft. . . . . Near the centre of the town was a large market-place, at one corner of which was usually the church; and it should be observed that the principal streets do not cross each other in the centre of the market-place, but run in a line with its four sides . . . . so that the traffic did not interfere with the central space." Our own opinion is, that this plan of rectangular divisions, which is also that adopted in the United States of America, is *not* a good one, for reasons which we shall presently state; nevertheless, it is a great improvement on old customs, and has no doubt some special advantages.

* This remark applies to Mediæval cities in Europe. Marco Polo, writing in the thirteenth century, describes Pekin as formed in a regular plan of squares, like a chessboard, a plan of ancient adoption in China.

The foundation of new towns seems to have ceased shortly after the thirteenth century, and the principal cities of Europe appear to have been built up from time to time in a haphazard manner, whilst their internal condition was of the worst description, of which an idea may be formed by reading the article "Paving of Streets," in Beckman's "History of Inventions," volume 1. In the seventeenth century, however, the Great Fire of London (1666) produced two plans for the systematic arrangement of new streets, &c., which present some new and noticeable features. They were designed by Sir C. Wren and John Evelyn, and both are engraved in Strype.

The fire destroyed buildings estimated at about 13,200 houses, covering an area of 436 acres, and, both in form and extent very closely corresponded with the great fire of Chicago, in 1871; besides dwelling-houses, St. Paul's Cathedral, eighty-seven parish churches, the Exchange, and other public buildings were burnt, and an opportunity was afforded of designing, as it were a new city. Sir C. Wren's is shown on the wall. Leaving out details, he proposed to form three kinds of streets, 90 ft., 60 ft., and 30 ft. wide respectively; to form a canal of Fleet Ditch, to be 120 ft. wide; a quay along the river-side 40 ft. wide; the principal public buildings to be massed together round the Royal Exchange, on a large area of octagonal form, from which radiated the main streets, and in which, at stated intervals, were to be placed the various churches, whilst all churchyards and "unnecessary vacuities, and all trades that use great fires or yield noisome smells" were to be outside the town. This plan of Wren's is a great advance on the old system, or rather no-system, and, indeed, in some respects, could scarcely be improved upon. We need hardly say, however, that neither his nor Evelyn's plan was adopted, much to our loss at this day.

When the great fire took place at Chicago, it occurred to me that an opportunity presented itself of laying out the new city on an entirely new plan. I had not at that time seen Wren's plan for rebuilding London; but it required only some consideration to be convinced that the rectangular plan common in the States was open to many objections, and that an entirely different principle should be adopted. That principle I found in the spider's web, especially in the web of the "geometrical spider," in which the quickest way of reaching the centre from any given point is clearly obtained; and time is, we know, money, which all men now seek after so earnestly. My further ideas on the subject will perhaps be best understood by the papers I sent to the Mayor and municipality of Chicago on the subject, and from which I give the following extracts:—

The main plan is to be on concentric circles, or rather semi-circles, divided into sections by radiating streets, and sub-divided into wards, to be provided with means against fire, and sanitary arrangements complete in each section respectively, corresponding to our old system of wards or guards. In re-building the city, advantage might be taken of a combination of squares, crescents, terraces, boulevards, and streets, so as to produce the greatest pictorial effect. The houses might have colonnades on the lower story, as at Bologna, forming comfortable walks in summer or winter, whilst arcades, like those of Milan and Paris, should connect the principal points of interest. All buildings should be constructed as nearly fireproof as possible, and permanent sites for fire escapes be established at stated distances throughout the city. To avoid the monotony which characterises the new portions of Paris, Lyons, and other French cities, in which large blocks of new buildings have been lately erected, and one street so closely resembles another that sometimes you can hardly say in what street you are, I propose that various styles should be assigned to various blocks of buildings, so that all styles of architecture may be represented—Greek, Italian, Gothic, Lombard, &c.—as may be found consistent with good taste. Moreover, we should thus avoid the unsightliness commonly seen in England, of buildings widely different in style, out of all harmony, and sometimes painfully incongruous, placed in juxtaposition and mutually destructive of each other's effect. I would suggest that all buildings wherein large masses of persons congregate, such as theatres, churches, assembly-halls, &c., should be provided with numerous ways of speedy egress, not only for safety's sake in case of sudden panic, but for the ordinary convenience of the crowd; whilst the ways of ingress may still be few in number. Public baths and laundries, and public kitchens and bakeries for the poor, should be established in the poorer quarters of the town, as well as a regular system of public drinking-fountains for men and cattle. There should be a large public park, gymnasium and baths, and a public garden with terraces and fountains, laid out on the model of the old Italian gardens, such as, for instance, that of the Pitti Palace at Florence; these should be connected with the boulevards, which might consist of a central paved promenade lined with trees, having a road and tramway on each side, furnished with a handsome paved way next to the houses for foot passengers. An example of this kind, which produced an excellent effect, I have seen at Toulon, and would carry out on a larger scale.

A few good canals, crossed by ornamental swing bridges, as in Holland, might serve to connect the traffic of Lake Michigan with the principal railway stations and the Illinois canal. Spacious markets should be erected in central positions; those for fish being furnished with troughs to each stall, filled with water, in which fish can be kept alive, as in the "Halles" at Paris. Abbatoirs, cattle markets, and all offensive or dangerous manufactures, should be kept outside the city precincts, and finally, not only should a system of sewerage be carefully prepared, for the purification of the city, but the sewage matter should be utilised as manure, which might prove of incalculable service on the cleared prairie land of the State; and in all cases, it should be borne in mind, that as Chicago has grown so rapidly in the past, there is every reason to believe that it will increase still further in the future; therefore, whatever is done, an eye should be kept to the requirements of an increased population.

It may appear fanciful, and yet in many respects a large city appears to me to resemble a human being. It has arteries and veins, or large and small thoroughfares, through which the blood corpuscules, in the shape of men and women, continually circulate. It has a heart; its centre, where all meet, and where the great business of life is mainly carried on. Lungs, or parks, and open spaces in which the air is purified; it requires water reservoirs and apparatuses for receiving and discharging solid and liquid secretions, by means of drainage and sewage, outside the body corporate; moreover, to complete the resmblance, the surface of the city, its skin, so to speak, requires constant cleansing by water and friction, to insure that cleanliness which is essential to health; whilst the municipality may be regarded as the brain, which brings experience and science to bear on the regulation of the entire body, having an equal regard to the convenience, health, and external appearance of the whole city.

As regards the figures adaptable for the block plan of a city, with its thoroughfares, it will be seen that the choice lies almost entirely between a square, a parallelogram, or a circle; and our own opinion is all in favour of the last named, both for beauty and convenience.

Space, air, and trees should enter into all plans for new towns or new quarters, and I would propose that instead of the old system of gardens at the back of two houses, the garden should be in front of the house, then the pavement and road for ordinary traffic, with a double tramway in the centre for the carriage of trains and cattle, not by steam but by horse-power; for there seems to me no valid reason why railway trains should not be carried right through a city without changing. This of course would necessitate a much wider roadway than is common at present. All streets, terraces, &c., should be provided with back roadways for house service, coals, dust, and the carting away of refuse or sewage matter; and in a well-arranged city a back road to each street will be as necessary as a back staircase in a well-arranged house.

Society of British Artists.—The fiftieth exhibition made by this Society, and now open in the Suffolk-street Galleries, consists of 924 paintings and drawings, and four small pieces of sculpture. The president of the Academy sends a portrait, and Mr. Leighton, R.A., some small contributions. The collection cannot be said to be strong in figure-pieces, but has some good and many pleasing landscapes. We will take an opportunity to speak of it more at length.

SCHOOL BOARDS.

London.—The Works Committee recommended the acceptance of the lowest tender, that of Messrs. Perry & Co., of Tredegar Works, Bow, amounting to 7,178*l.*, for the erection of schools designed by Mr. E. R. Robinson, to provide for 1,100 children, on the site in Globe-terrace, Hackney, purchased for the Board for 3,000*l.* 19*s.* 6*d.* The list of these tenders has already appeared in our columns.

Northampton.—The following letter was read by the clerk with respect to the sites selected by the architect chosen by the Board:—

"I have the honour to acknowledge the receipt of your two letters of the 28th ult. The official architect reports as follows upon the plans for the Spring-lane site:—'These plans are satisfactorily arranged. There is accommodation for 673, viz., 198 boys, 198 girls, and 279 infants.' His report on the plan for the school to be built on the site near Vernon-terrace was as follows:—'The arrangement for the boys' and girls' schoolroom should be revised in accordance with rule 4. The present arrangement causes considerable loss of desk and bench space. If properly arranged there would be accommodation for 540, viz., 160 boys, 160 girls, and 220 infants. My Lords acquiesce in the Board's proposal to purchase the small additional piece of ground adjoining the Vernon-terrace site.'—I am, &c., P. CUMIN."

Bristol.—The School Design Committee brought forward fifteen tenders for the erection of new schools in Freestone-road, St. Philip's. They recommended that the tender of Messrs. Bevan of Bedminster, be accepted at 3,080*l.*, if the foundations were of Hanham stone, and 3,170*l.* if of brick. This and matters tending to reduce the cost somewhat, the committee suggested, should be left to the architect, Mr. Coleman. The report was agreed to, and also recommendations for asphalting the yard, and obtaining designs for school fittings, and borrowing 4,000*l.* from the Public Loan Commissioners to cover the cost of the land and erection of the building.

Halifax.—The Sites and Building Committee reported that the Education Department had finally approved of the plans for the Queen's-road Schools, and would recommend the Public Works Loan Commissioners to grant a loan of 10,220*l.* 17*s.* 6*d.* on their account. The committee suggested that the plans and specifications of Booth Town School be sent to the Education Department, and that on their approval tenders should be invited for the works. The report was adopted.

STONE FLOORS.

SIR,—I have a floor of very soft stone. The goods are spoiled by the fine dust from the said floor. I should be glad to know of any material to put upon the surface, say ½ in. or ¼ in., from which there would be no dust. Anything like the foreign asphaltes would do, but for the cost. Perhaps ordinary asphalte would do, if it could be made very good. The method of combining tar and Portland cement, and the purposes for which it is wanted, would also oblige A CONTRACTOR.

ON MODERN ART-ARCHITECTURAL CRITICISM.*

IT is not our intention to attempt an elaborate essay on the subject of criticism generally, or to venture even to glance at the large area of its subdivisions lying open for dissertation; nor does it immediately concern us at the present moment to inquire whether to Aristotle we owe the art or science of criticism, or whether in their day, Aristarchus, Varro, and Longinus were distinguished "practitioners," or Hesychius, Dionysius Alexandrinus, Eusebius, St. Jerome, &c., "masters," of the art.

With the limited space at our disposal it must suffice us to know that from the eleventh to the eighteenth centuries this art, or science, has possibly, somewhat interruptedly, been made a "study," and in the sixteenth, seventeenth, and eighteenth centuries raised to a "polite art" by all nations of the globe who boasted of any amount of cultivation or refinement.

Up to this latest date even was critisim invested with good sense, logic, and an inflexible rule of fair dealing, placing the critical works and essays of the time amongst the best of our standards now, it was left to our more enlightened (or more degenerate, as our readers may prefer) days to totally ignore the "*kritikos*" or power of *judging* in such matters, to forget that "criticism" involves seeing beauties as well as faults, to be oblivious of the fact of its requiring discrimination, exactitude, and the impartial hand which should hold the scales whilst the trembling balance wavers betwixt praise and blame.

We have changed all this; for the better? No. With a practice apparently far more consonant to modern times and taste, we, as a rule, indulge in undiscriminating and uncompromising condemnation until, almost in despair, we find ourselves in this nineteenth century asking, "What *is* criticism? In what does it consist,—in analysis, or in mere expletive verbiage?"

To a greater extent, possibly, than ever previously occurred, the press is now mainly the reflection of public opinion and feeling on most matters of social importance; and yet, judging from the contributions of some, at least, of our contemporaries, and the editorials of a portion of the press, there is no such thing as criticism apart from a moral vivisection, not of the *matter* but of the *man*, and that true criticism should consist, not in the scientific use of the dissecting-knife, but in a perpetual wielding of the tomahawk and scalping-knife; in constant endeavours to maim and mutilate the entire structure, good and evil, rather than to delicately probe and scientifically diagnosticate, with a view of preserving the sound and severing the obnoxious portions.

Undoubtedly the philosophical, political, and, in spite of a prejudice to the contrary, even the theological, fields of literature are well supplied with eager, accomplished, and generous workers, who, more frequently than not, seem imbued with a true spirit of criticism,—"judging," or at least to the best of their ability attempting to judge, in the best sense of the word, the various doctrines, hypotheses, and party views which come to their notice.

It is only when we reach the confines of art,—or most certainly of art-architectural criticism,—that we observe at once the traces of an internecine strife rather than the symbols of dignity appertaining to a judgment-seat.

Whether it is that from the very refinement of art its devotees become abnormally sensitive and irritable, we are unable to say, but it is undoubtedly a fact that as a body we seem singularly deficient both in justice of discernment and fortitude of endurance when jousting in the arena of criticism.

Nor even in this arena is it by any means a struggle of honest, above-board, hard blows, and harder returns. Our anonymous attacks partake more of guerilla warfare than of the lance and the quarter-staff, and in the few contests that do openly occur the aim appears to be as to who can throw most mud, in the praiseworthy hope of some sticking, rather than an endeavour to discuss the merits of the subject more immediately under review.

Surely when we become art-workers we need not cease to be generous! Or is it that we are under a delusion that manliness consists in much abuse, and that it would be a deplorable weakness to indulge in gentle and generous recognition of merit in any work of a "brother-in-art"? If it be true that "out of the abundance of the heart the mouth speaketh," it is to be hoped, in the name of all that is human, that there is a vital distinction between that of an ordinary social being and the same individual when transmogrified into an art-architectural critic.

Moreover, is not the course we pursue,—to take a more practical, if somewhat lower, view,—commercially an error?

Is not the mind of the public already sufficiently callous to the merits of our art (prone to look upon us, even at the best, as evils necessary, but a nuisance) as scarcely to need the constant iteration of intestinal squabbling to confirm it as to our weakness and our folly?

If, therefore, this unfortunate fluency and frequency of critical commonplace, seasoned with a strong spice of what may be termed "literary acrobatism," is known to repel not only the mere surface-skimmer, but the earnest thinker and well-wisher, to make architecture as an art less entrancing and its practisers less influential, shall we of ourselves both propagate the offence and weep over the result?

Not only in this general tendency to a cynical appreciation of others, in this disruption in our very midst, is danger to our reputation for strength of mind and common sense to be observed and feared, but even in the very advocacy of those earnest and pure-minded devotees of distinct schools whose enthusiasm is apt to deteriorate unconsciously into partisanship.

Not that we are by any means preaching a crusade for, or advocating, "'art for art's sake,' and no criticism," too conscious that in these days *that* must be a myth, a text, a peg on which to hang much fine writing, not a tangible fact on which to practise; but rather are we condemning "criticism for criticism's sake," seeking to eradicate that *odium architecturum* which, to our shame be it said, has long since in its virulence thrown far into the shade that proverb of bitterness the *odium theologicum*.

Let us consider for one moment, and take at random, in our own mind, any recent review or reviews on subjects architectural: what do we find?

A practitioner is inexcusably successful over his compeers! Immediate suggestions are covertly made as to local or other interests, or sinister imputations of some marvellous forecast on his part, delicately veiled under the description of his being "wise in his generation." He may have committed the indiscretion, at some early period in his career, of writing a book, and may have since become, as well as a literary man, an accomplished architect: nevertheless, without the least examination of the architectural work supposed to be under review, he is immediately twitted with his former literary efforts, and assured that in those alone is he "at home"! He may have become famous in church architecture, and a secular work falls into his hands: never mind that he is an able, conscientious man, and his work a success, you will hear on all sides that "it savours of ecclesiasticism, it is 'monastic'"; "very suitable for the Dark Ages, no doubt, but utterly unfitted for modern requirements"; that he had much better "keep to the path in which he had distinguished himself"; and so on: but not a word of real criticism of the work, though much on the man, not a word of argument or proof to support the mere assertions of the critic. Should he have given his attention early to, and have gained a reputation in, the more decidedly decorative portions of the profession, we hear glibly repeated that he is not a "practical man," or that he can "decorate a house, but cannot build one," regardless of the actual fact that the criticised has probably built more than all his critics together! And so on through all phases and all branches of professional practice it seems the constant endeavour of the critic to import into his criticism as much of the man as possible, and to carefully avoid any impartial consideration of his work.

Failing these more personal notices, we obtain either a vague, dreamy, nerveless, "damning with faint praise," or an impatient despotism of opinion, an unscrupulous wielding of intellectual force, goading the victim to an ingenious weaving of literary pitfalls, into which possibly he falls, to the intense delight of the anonymous fowler.

Surely this is scarcely fitting work for literary athletes; worse than useless in either forming or guiding public opinion; a safe and sure means of promoting jealousies and mutual mistrust amongst those who frequently have no possibility of professional intercourse with, or knowledge of, one another except through press notices of their respective works; of no more value in raising the standard of professional tone than attempting to steer a vessel by ignoring the compass and abandoning the helm; as short-sighted in policy as refusing a crop of sterling grain and revelling in the winnowed chaff!

And yet such appear to be modern notions of architectural criticism! Such the empty crumbs so greedily accepted and devoured as art-manna by a public eager for flitting pleasures, and anxious for seasoned dishes, even though they be made of devilled reputations!

Nor do we hear from our professional ranks one word of remonstrance; on the contrary, of all critics thus sinning we out of our own midst are undoubtedly the greatest sinners. Not from outsiders, but out of the mouths of "colleagues," of "brothers in art," or, as some will have it, of fellow "trade-unionists," have from time to time proceeded critical witticisms on contemporary works, which, however amusing at the time, are, we fear, not calculated to raise either the status of the critics or that of the profession they represent.

Quite recently we had the edifying spectacle of a member of the profession, writing of another still more distinguished member's crowning work, that "it would have been a lesser evil to have had a war or a pestilence than that such a building should be erected."

Is it necessary to quote further examples, which must occur to all who interest themselves in current professional topics, to account for the easy descent from such premises to the would-be scathing of a contemporary reviewer? Can we be surprised that the public fights shy

* By Alfred Jowers. Prize Essay, Royal Institute of British Architects.

of birds who so wilfully foul their own nest? Or that, on many occasions, public especially, we, as a profession, get unmercifully snubbed and morally kicked?

To what a painfully low ebb all sense of professional cohesion (other than that induced by a mutual "per cent." interest) has receded, may be judged of by the sole public reply vouchsafed but very recently to the proposal of a most worthy and respected member of our profession, who, in his earnestness, suggested the fencing round of our body by a code of honour, as a means of ensuring some measure of *esprit de corps* and uniformity in practice. And the reply? Not an eager acceptance of, but a duly printed and published protest against, the proposal as an act of "trade-unionism." Trade-unionism, forsooth! as though codes of honour and *esprit de corps* were terms synonymous for 10 per cent. and six hours' labour, or other of the constitutional symbols of trade-unions!

PART II.

Hence the unsatisfactory position of the profession, and the low estimation in which it is held by the public. For unsatisfactory the position is, however much we may attempt to ignore the fact, or to bolster up our own egotistic self-sufficiency.

Of course, it is equally true that the profession boasts a few *duces*, who, by reason of sheer force of character, intellectual attributes of an exceptionally high order, powerful friends, or even by luck of that "opportunity" which is said to occur to every man once in a lifetime, have won for themselves a position in which they are to a great extent paramount to the public; no less certain, however, is it that by that same public is the great majority of the profession held in supreme contempt, or looked upon at least with indifference.

In no other profession or calling under the sun are there so many wiseacres, so many amateur busybodies, capable in their own estimation of teaching us the thing which is or should be.

Every man or woman upon whom chance has conferred the somewhat doubtful benefit of the grand tour, or whose ancestors, with a hankering for a reputation as *literati* or *dilettanti*, had garnered certain art-books, thinks himself or herself fully as qualified to be as unsparing both of advice and criticism, as though by the purchase of curios they became at once distinguished in art, or by their formation of a marquetrie panel became masters of constructive science.

In what estimation would be held the amateur legal luminary? What is the term applied to the non-qualified medical practitioner? Are there no such beings as architectural quacks? No; at least not recognised as such; and why? Because, from the utter want of "bond" amongst the individual members of the profession we fail to stand out as a type or body definitely distinguished from the flood of irregular practitioners or amateur aspirants; and such is our liberal-mindedness, that even the suggestion of the slightest fence of a common understanding amongst us as men of honour is scouted as trade-unionism!

Nor is it possible to acquit the press of much blame in this matter. It is (or at least a portion of it) much too prone to admit the small backbitings of disappointed vanity or injured self-consciousness; too forgetful of how much good it might do to the future of its correspondents, and of the profession, did it sometimes put down its heel firmly on the snarling tendency of the unsuccessful.

Possibly a few "sensation" readers might be lost, but at most the weeding would be of those unhappy individuals who, in mere wantonness, delight in heedlessly impressing the mailed dents of their crotchets or their grievances upon the architectural toes of their "brothers-in-art." Anyway, the gain in tone would far counterbalance the loss in talent.

Of course, there is no denying the pleasure, the sense of power (akin to that of the priest in the pulpit) in anonymously wielding our literary weapons. Possibly there is scarcely one of us who has not at some time or other indulged in the luxury.

But there must be a limit to all things even to the keenness of a critic's scimitar, or the thickness of epidermis of the criticised.

Life, mental or physical, cannot be carried on in ecstasy, or prolonged on a diet of spiritual stimulants.

We cannot be always ignoring the fact of many colours combining to make the purest white, or ever be trying to thrust aside matter that does not meet our individual views as something repulsively evil, instead of endeavouring to evoke order out of chaos, and wisely building in afresh those elements which promise some virtue out of much that is vicious.

Probably we all occasionally read professional papers other than those more immediately relating to our own special calling.

Do we, in those devoted to Church matters, find reverend gentlemen indulging in scathing reviews and bitter criticisms of their colleagues' sermons?

Do we, in medical journals, see surgeons rushing into print, and recklessly imputing to brother professionals clumsiness and want of knowledge in operations, or hysterically repining that they were debarred from participating?

Do we, in the legal journals, find counsel, as an afterthought, reviling the speech of their advocate - antagonist? Or, to come still nearer home, do you read of members of the sister profession (engineering) hovering ever aloft, like birds of prey or harpies of old, hungering to mutilate or defile the latest creation of a colleague's brain?

No! So much the contrary, that on a recent occurrence of a symptom of failure (or what was at the time thought to be a failure) in a public work, it was engineers, to their honour, who calmly and judicially examined and reported, alike uninfluenced by public panic or professional jealousy.

Would any of the professional journals representing Church, law, medicine, or engineering, admit the petty jealousies with which our journalistic representatives occasionally disfigure their pages? Is it too late to hope that, however self-ennobling it may seem to a writer, rich in the sense of having nothing to lose, to hound down and try to "run to earth," as it were, a professional man whom skill or chance has raised to a more or less temporary pinnacle of fame, he may at least pause, and try the luxury of self-restraint, the novel charm of contemplating that what he may have missed in brilliancy of display, he has gained in his contribution to a general fund,—still sadly deficient,—of generous fellow-feeling.

Surely Malice was keen-witted, and Generosity dull and blind when many of these bitter-shafted criticisms were launched at the toil-worn and weary art-worker!

Keenly sensitive imagination, snubbed by the rude precocity of "common sense" or the "practical," and frozen by the prudery of rigid "precedent"!

Surely it is more to the glory, and tends more to the advancement of our art, that we should have a constant crop of ideas, a harvest of wrought-out thoughts, even though intermingled and partly choked with a rank growth of riotous seedlings tropical in their licence, rather than that the few choice blooms of elegant conception should lie broken and withered under an undiscerning egotism, crushed and mutilated under a wild avalanche of inconsiderate condemnation miscalled "criticism."

PART III.

Hitherto we have dwelt chiefly on those phases of adverse criticism which have had their origin more or less in professional or allied sources. It may be well, perhaps, that we should now turn to views expressed by those whom we may define more correctly as outsiders, and whose judgment might therefore be regarded as more impartial, or at least more unbiassed, than that of those actively engaged in the struggle of professional practice.

We may, moreover, state that neither in the observations we have already made, nor in the farther remarks we may offer, have we the least intention of suggesting a "masterly inaction" or "rest-and-be-thankful policy." On the contrary, we are desirous of moving with the times, not deprecating but anxious for criticism, and simply stipulating that it *should* be criticism, and not simply condemnation.

It would entail by far too long an essay to attempt an "ab initio" defence and reply to the many indictments against us as a body, or even to "hark back" to the early days of Government competitions, or even to the somewhat later "architects and market-gardeners" period of our exaltation! Moreover, there is now and then an attack which, favoured with the advantages of a strong position and forcible type, may be looked upon as proceeding rather from a "semi-professional" masked battery than from open foedom of an irritated or indignant public. And to what, when it is analysed, does this mitrailleuse discharge of random literary blows amount?

To a great many hard words, disagreeable suggestions, and impossible assertions, with a cheap and temporary notoriety for the author.

Nor is this by any means a difficult rôle to play; and this desire for notoriety is the only possible interpretation of the singular dogmas to which, under the influence of criticism, intellectual writers capable of brilliant composition can give birth.

Is it for a moment possible to conceive that any one man, wrapped as he might be in egotism, soured as he may have been by a dire train of untoward circumstances, could sit down and honestly think himself capable, in the course of some forty pages of letterpress, of attempting to detract from the reputations of some dozen men whose professional ability and social probity have, after years of earnest toil, met with acknowledgment from their brethren and approval and reward from the public? Could any sane person solemnly propose that, in these days of fierce competition and hand-to-mouth struggle for life, we should, crab-like, proceed backwards to those halcyon days which, Minerva-like, we fear, have but sprung ready-armed from the too fertile brain of the writer, but in which we are gravely assured that the architect, builder, clerk of works, and artizan were all comprised in one marvellous individual, the *bête-noir* of modern times, the irrepressible "working man"! Yet such is the advice, combined with the flattering unction, "that nothing would be more gratifying to our social progress than such an elevation of the men whose works continually affect our daily life. There will then be no need of the 'profession,' and architects will subside into their proper place as bookmakers, artists, business men, students of symbolism and archæology, and, in fact, pupils and illustrators of those very workmen whom they now profess to direct and to control."

As to the works of these gentlemen, in the face of universal strikes "continually affecting our daily lives," we think there can be but one affirmative opinion; but as to the "social progress" which would result from any sudden upheaving, or, we should more correctly say, any *further* upheaving of the social fabric, we must confess to a scepticism as extreme as that which forbids us for one moment to entertain an idea so preposterous as that the picturesque charms of Canterbury, the grandeur of Durham, or the chaste completeness of Salisbury were ever in either or all instances the sole conception and *execution* of one inspired head and hand; on the contrary, we are firmly convinced, and assert emphatically that, whether with or without drawings, there always did exist, and ever will exist, the same marked divergence of mental and physical labour, the same sub-divisions of master and subordinates, the artizan and labourer, as we now find. Undoubtedly, in the absence of mischievous agitation, there was one great difference; authority was kindly exerted, labour willingly conceded, and possibly from this alone arises the oneness, the immeasurable beauty and completeness of Mediæval works.

But, in fact, neither from these pseudo-professionals nor from the genuine and unmitigated "one of the public," is it possible to gather a tangible basis on which the ill-defined undercurrent of half-contemptuous, slighting, half-on-sufferance endurance of our profession at present rests. In many instances might we most appropriately borrow a simile of one of our would-be bitterest critics, and say that these aimless attacks are "*à propos* of nothing save of desperate imbecility."

Equally impossible is it to understand on what qualifications they venture to assume the judgment-seat, and to apportion the exact measure of praise or blame to be awarded their victims on the muster-roll of Art.

And yet *is* it so difficult to comprehend? Does it not all proceed, to borrow again from our friend the critic, from that half-knowledge that "puffeth up"?

"Knowledge" generally, and of ordinary topics—still less, technical knowledge of special subjects,—is no "heaven-born" gift, or a goal to be attained by any "royal road," but is the result of careful study, of sheer hard work, of untiring energy, perseverance, and ability rightly applied, in conjunction with eyes educated to see and a mind trained to receive the best impressions from the choicest sources.

With a mirage of such knowledge sufficiently like the real thing to avoid a crass exhibition of incompetence, with a keen pen, and a reckless conscience, what course easier than to titillate a

public, still less informed by an effectve chiaro-scuro of what they *get*, a brilliant rendering, Turneresque in its vagueness, of what they deserve to have?

Over and over again has the system been tried, nor has so well-worn a device a thread of novelty's rag left to cover its nakedness.

Politically it has been tried, and successfully tried, but men were slow to learn that they were poor, down-trodden worms, until by the same process of semi-excitation, semi-flattery, the fact was continuously dinned into their ears by ambitious individuals desirous of notoriety, and caring little who formed the rungs of the ladder which led to the longed-for prize. It was a stroke little short of genius which applied the same process to art.

From such teachers and such texts proceeded fruits which might well have been presaged. Much cant talk of "architectural imposture," "draughtsman's dull labour," "deceptive custom," "imitative second-hand work," &c., widely sown, brought forth a plentiful crop of unthinking persons, who became intoxicated with such literary nectar. With large views and small means, filled with the little knowledge which is dangerous, taught to look with contempt upon their architectural advisers, possessing no magician's wand, and yet desiring a realisation without counting the cost, can we wonder that a public was produced which, trusting to its own devices, commenced with precipitation and ended with prejudice? Perhaps we *may* wonder that this prejudice was fastened as an incubus on our unhappy backs.

Nor would this be worthy of one moment's regret were an architect's works, like the fame of modern critics and essayists, a thing of the day,—a mere passing, evanescent "sensation;" but happily (or unhappily), perhaps from the very fact of our work ministering to a man's necessities, it is stamped with permanency, and becomes at once either a monument of fame, or a target for scorn. Wielding the intractable, bending not only matter but wills to our purpose, with our sterner materials providing a home for our hand-maiden, Sculpture, and a clinging place for the beautiful exotic, Painting, our realisations stand for good or for evil as a record for future generations, not only as a standard of art-practice of the period, but also according to the measure of praise or blame they may receive, of the generous intelligence or apathetic ignorance of contemporary public opinion and judgment.

Looking to what is required of us, and the difficulties of fulfilment, we might reasonably have looked for sympathy and strengthening support, rather than injustice and unfair depreciation; but, nevertheless, sure are we that from all these flustering flames and ashes of discontent, Phœnix-like, our profession will arise the brighter; that the long list of famous names,—from Buono and Peter di Cozzo to Giotto and Wykeham; from Brunelleschi and Leon Battista Alberti to Sanmicheli, Michelangelo and Philibert de Lorme; from Jones, Wren, Vanbrugh, Wyatt, and Dance, to Basevi, Barry, Pugin, Cockerell, and Pennethorne;—will be prolonged with lustre undiminished in the hands of our present leaders, whose names, unhappily, conventional good taste forbids our particularising; and that when they in the autumn of their prosperity and zenith of their fame withdraw from the struggle, the standards relinquished will (enriched by their names) be eagerly seized and nobly pressed forward by a younger school, whose brilliant promise will ere then, we trust, have blossomed into a successful career.

Meanwhile, to all of our maturer brethren and younger colleagues who, suffering under censure, ill considered, or obloquy undeserved, may feel themselves unnerved, unfitted for the fight, we would commend the thoughts of one who, not always free from censure, even when painting word-pictures of surpassing brilliancy, yet built himself an imperishable fane in the world of literature, and dying, bequeathed in winged words, a sentiment to us most singularly fitted:—

"I direct that my name be inscribed in plain English letters on my tomb. I conjure my friends on no account to make me the subject of any monument, memorial, or testimonial whatever. I rest my claims to the remembrance of my country upon my *published works*, and to the remembrance of my friends upon their experience of me in addition thereto:"—

Of, "Si monumentum quæris circumspice," a noble paraphrase.

ON THE ECONOMY OF FUEL FOR DOMESTIC PURPOSES.

On this important subject, Captain Douglas Galton, C.B., read a paper at the Society of Arts on the 2nd inst. We condense portions of it.

The total quantity of coal now annually consumed in the United Kingdom is stated by Sir W. Armstrong to be about 110 millions of tons. The Coal Commission estimate that the consumption of coal may be roughly divided into three parts, one-third being used in manufacturing processes, one-third in steam-engines, and one-third for domestic purposes. On this assumption, therefore, the latter may be assumed at nearly 37,000,000 tons in the year. This means a consumption of about one ton and a fifth per head of the population. I am, however, inclined to think that the amount is over-stated, and that probably even one ton per head of the population of the United Kingdom would be somewhat in excess of the average. The increase in the price of coal, of from 25s. to 30s. a ton, which we have recently experienced, is thus equivalent, on this assumption, to a tax of from 1*l.* 5s. to 1*l.* 10s. a head.

I think I may say, without hesitation, that the quantity of fuel now absolutely wasted in our houses amounts to at least five-sixths of the coal consumed. That is to say, if the greatest care and the best method of applying the heat were in all cases adopted, we could effect in heating and cooking all that we now effect, with one-sixth of the coal we now use; and if, in the construction of our fireplaces and cooking apparatus, simple principles were recognised and ordinary care were used, we might without difficulty save from two-thirds to half of the coal consumed. Therefore, instead of consuming 32,000,000 tons per annum for domestic purposes, we should not consume, if coal were fully economised, above 5,000,000 tons, and, if even only moderate economy were practised, from 12,000,000 to 16,000,000 tons only need be used. Thus, this economy in the household consumption of coal would enrich the nation to the extent of from 20,000,000*l.* to 30,000,000*l.* annually.

One pound of coal is capable, if all the heat of combustion is utilised, of raising the temperature of a room, 20 ft. square, and 12 ft. high, to 10 degrees above the temperature of the outer air. If the room were not ventilated at all, and the walls were composed of non-conducting materials, the consumption of fuel to maintain this temperature would be very small, but, in proportion as the air of the room was renewed, so would the consumption of fuel necessary to maintain that temperature increase. If the volume of air contained in the room were changed every hour, one pound of coal additional would be required per hour to heat the inflowing air, so that to maintain the temperature at 10 degrees above that of the outer air during 12 hours would require 12 lb. of coal.

One pound of coal may be assumed to require, for its perfect combustion, 150 cubic feet of atmospheric air; 8 lb. would require 1,200 cubic feet; but, at a very low computation of the velocity of the gases in an ordinary chimney-flue, the air would pass up the chimney at a rate of from 4 ft. to 6 ft. per second, or from 14,000 to 20,000 cubic feet per hour, with the chimneys in ordinary use, and I have often found a velocity of from 10 ft. to 12 ft. per second giving an outflow of air of from 35,000 to 40,000 cubic feet per hour. This air comes into the room cold, and when it is beginning to be warmed it is drawn away up the chimney, and its place filled by fresh cold air. A room 20 ft. square and 12 ft. high contains 4,800 cubic feet of space. In such a room, with a good fire, the air would be removed four or five times an hour with a moderate draught in the chimney, and six or eight times with a blazing fire; the air so removed would be replaced by cold air. The atmosphere of the room is thus being cooled down rapidly by the continued influx of cold air to supply the place of the warmer air drawn up the chimney. The very means adopted to heat the room produces draughts, because the stronger the direct radiation, or rather the brighter the flame in open fireplaces, the stronger must be the draught of the fire and the abstraction of heat. The only way to prevent draughts is to adopt means for providing fresh warmed air to supply the place of that removed.

Warming by means of air conveyed by flues to various parts of the building, will answer, as a rule, in ordinary existing houses, best in connexion with open fireplaces, which draw in the warmed air to the various rooms, because there must be some means of forcing or drawing the warmed air into the house, and it would not be convenient to keep a steam engine in an ordinary house to pump in the warmed air. These open fireplaces would then, however, be wasting the spare heat which each fireplace sends up its own chimney; but, on the other hand, very much smaller fires would be needed to keep the rooms warm, than when the rooms are not supplied with fresh warmed air. Theoretically, however, it can be shown that if we are prepared to give up open fireplaces, and arrange our houses on the plan of having flues which would draw off the air from near the floors of our rooms, and which would also warm fresh air, heated from a central fire, to be constantly admitted near the ceilings, and if the climate were such as to make us desire to have the system in continuous operation, such a system would prabably be by far more economical of fuel than open fireplaces, because the fuel used could then be made to do its full duty. The variations of our climate, and the low price of fuel which have hitherto prevailed, have prevented such systematic arrangements from being adopted in this country.

The plan of carrying the heat from the fire to the air to be warmed by means of hot-water pipes, affords, also, a very economical method of warming air, because the best constructed hot-water apparatus will enable the full heating value to be got out of the fuel. Fuel may be consumed to far greater advantage in a close furnace than in any open grate, because the admission of air for the combustion of the fuel can be regulated to any required extent. The heating surface of the boiler may also be so arranged as to absorb a very large proportion of the heat generated by the fire.

But in deciding on the amount of heat in hot-water pipes which is most favourable to economy, the following considerations occur:—At least twice the quantity of air which is strictly necessary by theory passes through the fire in the best constructed furnaces. In an ordinary grate this consumption is enormously increased. Each part of oxygen supplied by the air and necessary for combustion is accompanied by four parts of nitrogen, which is of no value for combustion. Consequently, if twice as much oxygen passes through the fire as is strictly necessary, we have one part which combines with carbon and produces combustion, and nine parts which, being inert, must act, in the first place, to lower the temperature of the fire; and, secondly, to carry a larger amount of unutilised heat up the chimney. Moreover, when water is heated sufficiently to generate steam, each particle of water converted into steam absorbs or makes latent 960° Fah. of temperature. In experiments on the evaporation of water, the temperature of the gases passing off in the chimney was ascertained to vary from 430° to 530°, diminishing to 415° at the top of a flue 35 ft. high, with dampers open; and about 380° at the bottom of the flue with the dampers closed. With a boiler of which the temperature of the water is maintained at 200° without evaporation, the temperature of the flue need not exceed from 230° to 240°.

It is clear from these considerations that, in order to ensure the maximum effect from the fuel, the heating surface of the pipes should be sufficiently large to warm all the air required without its being necessary to raise the temperature of the water in the boiler to any great extent, and the proportion between the boiler surface and the pipe surface, that is to say, between the surface which absorbs heat, and the surface which gives out heat, should be such as to render it unnecessary for the fire to be forced, because the lower the temperature at which the gases from the fire pass off up the chimney, the greater will be the economy.

In order to show the waste which results from forcing the boiler, *i.e.*, from passing the gases into the flue at a high as compared with a low temperature, I will give an instance of one experiment. The proportion of heating surface in the boiler to the heating surface of the pipes, is assumed by some manufacturers as 1 to 100, or, when great heat is required, 1 to 40. An experiment made on 4,000 ft. of pipe, heating certain greenhouses with a wagon-shaped boiler with 40 square feet of heating surface, showed that a certain temperature was kept up for 8 hours with 8 bushels of coal; but when, by the addition of another boiler, the heating surface of the boiler was increased to 80 square feet, the temperature could be maintained for the same period with 4 bushels of coal. The outer temperature was the same on the two days.

On these grounds it is not so economical, so

far as the consumption of fuel is concerned, to use steam instead of water, either water heated to a high temperature under pressure, or to heat air for warming purposes, because the gases from the fire employed to produce the higher degree of heat will pass off at a high temperature, and the heat they contain be wasted. On the other hand, the capital outlay required where highly-heated pipes are used, is smaller than with hot-water pipes, because a smaller heating surface, and therefore smaller pipes, will suffice when the temperature is high; and, moreover, a very small pipe will convey steam to any required place; whereas, with hot water, at a relatively low temperature, much larger pipes are required. It follows that where the price of fuel makes it necessary to reduce the permanent annual expenditure, the original capital outlay must be increased. There is a further consideration in regard to economy with hot-water pipes, steam-heating, and all appliances for warming buildings from a central fire, viz., that if the heat has to be conveyed for long distances before its useful application comes into force, very much heat is lost, and consequently fuel is wasted. On the other hand, against the saving which would result from a more immediate application of the heat to the place to be warmed, there is to be weighed the diminished expense of attendance consequent upon the use of one fire instead of several fires, each with its attendance and supply of fuel. There remains one source of economy to be applied to close grates used for heating water, which has not yet been adopted. I mean the application of some of the heat which is passing into the chimney to warm the air which feeds the fire. Theoretical considerations show that an advantage of from six to nine per cent. might be obtained from this source, and the experiments which I have made bear out this result.

But, after we have designed the most effective arrangements for economising the fuel which warms our dwellings, if that object is to be fully secured, we must arrange to retain the heat in our houses. The architect should devote to these considerations the same care which he now is frequently satisfied with bestowing upon the beauty of the design for a building. The arrangements of the plan should be adapted to the retention of heat. All portions of houses exposed to the air should be formed of materials which are found to be the slowest conductors of heat. Whatever may have been the *lâches* of the manufacturers of fire-grates or kitchen-ranges, the nation has latterly very much disregarded the means of retaining heat in the house. The uniform model-house of the speculating builder is constructed with thin walls, thin glass windows, ill-fitting casements, and a roof of slates, with nothing under them. The old half-timbered house was warm, because it had an air space between the inner and outer skin; the brick-built, stone-faced house is warm because it has, so to say, a double wall. In modern houses it has long been shown that, without much increased expense, the use of walls built hollow will keep the rooms effectually warm and dry, and yet this mode of building is the exception rather than the rule, possibly because it gives the architect or the builder a little additional trouble. A slated roof, if ill-constructed, is a material agent in allowing of the escape of heat, because there is necessarily an inlet for air where the slates overlap. The old thatched roof, although most dangerous in cases of fire, was a great preserver of heat. In well-built modern houses the slates are laid on felt, which is laid on close boarding, and this arrangement keeps the house warm in winter and cool in summer. As regards the windows, glass ranks high as a non-conductor of heat, and the effect of using thick glass, instead of the very thin glass so often seen, is very largely to economise the heat. Evidence of the cooling effect on the air of a room of a window of thin glass is afforded by the cold draught which anyone perceives when sitting on a cold day near a closed window of thin glass. Proposals have been often made to glaze a window with double panes; and no doubt such a plan is a good means of retaining heat in the room, but the inside of the glass between the panes will in time become dirty, and then it can only be cleansed by removing one of the panes. A more convenient, but more expensive, plan is to adopt the system, which prevails universally in the northern parts of Europe, of a double casement.

It is not, however, my object here to give a treatise on building. The conclusion which I would draw from these various considerations is, that if we desire to economise to the utmost the daily expenditure of fuel, we must increase our outlay of capital. So long as coal was cheap, it may have been better worth the while of the individual consumer to employ coal wastefully rather than spend money upon the arrangements for economising heat. On the other hand, when coal is dear, the daily expense from the waste of fuel will induce a capital outlay to secure economy of heat.

The question of saving fuel for cooking purposes is even more important than economy in warming; because cooking is an operation required every day, and the waste of fuel in cooking is even more considerable than in warming.

An ordinary cooking-range in houses which, for convenience, may be designated middle-class houses, is derived from the time when the same fire was used for cooking and for warming. It is interesting to consider Count Rumford's remarks on this question. He largely developed the use of steam for cooking in large establishments, but in considering private kitchens he showed that 9-10ths of the heat produced in cooking operations was wasted, and only 1-10th utilised in cooking, by the use of open fireplaces. He laid down the following principles on fireplace construction.

1. Each boiler, kettle, and stewpan should have its separate fireplace.

2. Each fireplace should have its grate, on which the fuel must be placed, and its separate ash-pit, which must be closed by a door well fitted in its frame, and furnished with a register for regulating the quantity of air admitted into the fireplace through the grate. It should also have its separate canal for carrying off the smoke into the chimney, which canal should be furnished with a damper or register. By means of this damper, and of the ash-pit door, the rapidity of combustion and generation of heat is regulated, and on the proper use of the two registers the economy of fuel will much depend.

3. In fireplaces for all boilers which are too heavy to be easily lifted with the hand, an opening just above the level of the grate should be made for introducing fuel to the fire, which opening must be closed by a close-fitting stopper or door. In fireplaces constructed for small stewpans this opening may be omitted, and the fuel be introduced through the opening into which the stewpan is fitted, by removing the stewpan occasionally for the purpose.

4. All portable stewpans should be circular, and suspended in their fireplace from the circular rim. The best form for large fixed boilers is an oblong square, broad and shallow rather than narrow, and deep, and it should be of thin metal.

5. All boilers and stewpans should be fitted with covers to render them well adapted for confining the heat. The best arrangement is to make the covers of thin sheets of tinned iron, and double; that is, with an air-space between the outer and inner cover.

We have, during the last twenty years, introduced, as a rule, close ranges. They are certainly cleaner and more convenient for cooking, and, if great care be exercised in the use of the dampers, they will be found more economical than open fires. But, as a rule, they are based on the principle of making one fire perform a variety of operations. Independently of the question of a combined fire, as compared with the separate fires advocated by Count Rumford, a consideration of the form of modern kitchen-ranges will show that most of the principles laid down by him have been entirely neglected. The doors of the fireplace and ashpit seldom fit close; the boilers are rather deep and narrow than broad and shallow; the use of the hot-plate prevents the stewpans from being suspended from the rims for the fire to play round them; the use of double covers for saucepans and boilers is rather a rarity than a usual arrangement.

I have already mentioned several points of detail where fuel can be saved in our kitchen ranges, viz., by great attention to the close fitting of the ashpit and fire-grate doors, the use of double covers to saucepans and boilers, the use of sand on the hot-plate to prevent the escape of so much heat from that part; and beyond these an important point in securing economy is the separation of those culinary processes which require different gradations of heat. The three main parts of the ordinary cooking apparatus are the oven, for baking and roasting, the boiler, and the hotplate. If the boiler is to be of the form most effectual in saving fuel, the flame and gases from the fire should play under and round every part of it; the water should be kept at something under 212°, so that the gases, after leaving the boiler, may not enter the flue much above that temperature, and, inasmuch as that is a higher temperature than is necessary for the purpose of producing a sufficient draught in an ordinary chimney, the heat in these gases should be still further utilised. In the first place, they should be used to warm the water which will be required to replace what is drawn off from the boiler; and, in the second place, an economy can be obtained by employing the gases, which pass off into the chimney at a temperature above what is required for creating an efficient draught, to warm the air supplied to the fire for purposes of combustion. The experiments which I have made on the supply of warmed air to feed the fire, have, unfortunately, not been worked out sufficiently to enable me to give them in a clear form with exact results; but an economy of from 6 to 9 per cent. might be obtained from this source.

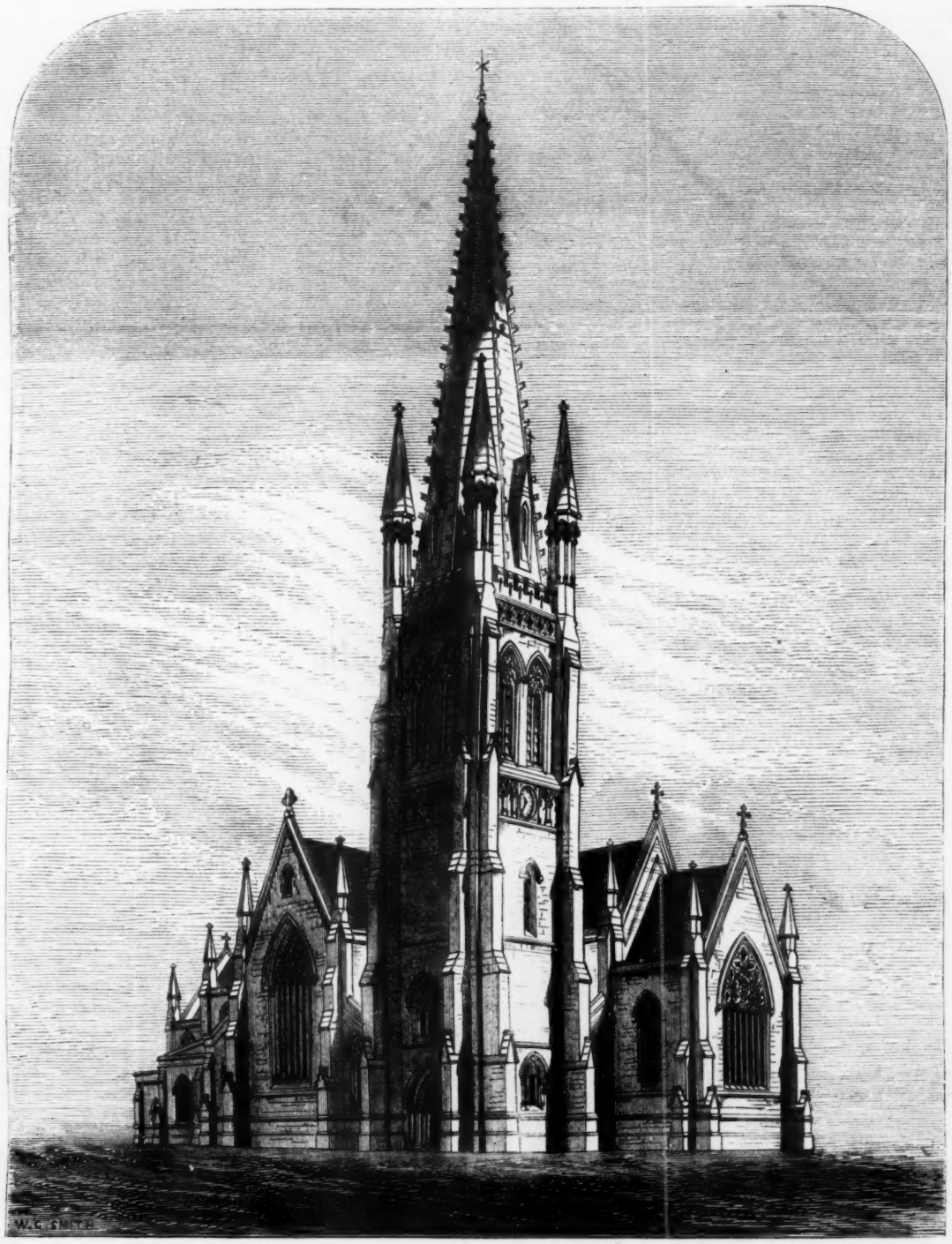
PROPOSED CATHEDRAL FOR GOULBURN, NEW SOUTH WALES.

THE Cathedral about to be erected in the rising Australian town of Goulburn, and of which we give an illustration, will also be the parish church, the present church being notoriously inadequate to the requirements of the population. The Bishop of Goulburn, on his arrival seven years ago, found himself surrounded by perhaps unprecedented difficulties, and by claims which at that time appeared to be of a more pressing nature. He therefore resolved to postpone it. The diocese, containing an area of 120,000 square miles, was to a very great extent destitute of clergymen and churches; and the want was universally felt. The bishop, therefore, in the first place devoted himself to the task of aiding the parishes to provide clergymen, churches, and parsonages. By the divine blessing the result has been the introduction of twenty-four additional clergymen, and the erection of twenty-five churches and ten parsonages of a substantial character, at very great cost. Besides, a sum of about 4,000*l.* has been collected towards the endowment of the bishopric. When present arrangements are completed it is expected that the diocese will possess forty-six churches, nineteen parsonage-houses, and twenty-nine clergymen. Thirteen wooden churches are not enumerated.

During this interval the colony has passed through great vicissitudes and a very severe financial crisis; and it has been only by great effort and much self-denial on the part of the bishop, the clergy, and the members of the Church generally, that these results have been attained. Much, very much remains to be done, independently of the duty of completing the fund for erecting Bishopthorpe.

Meanwhile Goulburn, the centre of operations for the diocese, while unselfishly assisting the interior from year to year, has itself been somewhat neglected. And now the feeling is well nigh universal that the time has come to provide more adequate and more suitable accommodation for the city. Goulburn has a population of about 4,000; but the present building will scarcely accommodate 400 persons. The new building will be a cathedral church for the diocese, and at the same time a parochial church for Goulburn.

The proposed cathedral will be in the Decorated style; the walls to be built of the blue rubble stone of the neighbourhood, the facings, dressings, &c., of white sandstone from Wingels, and the nave pillars of blue stone from Melbourne. The nave and choir are to measure 146 ft. long inside, and 95 ft. inside across the transept. The width of the nave and aisles inside will be 54 ft., and the height of the clear-story wall, 36 ft. The tower and spire at the south-eastern angle will measure to the top of the finial 185 ft. At the west end there will be a narthex and two porches, and above the narthex a recessed gallery for the organ, opening by a large arch into the nave. The nave, transept, and aisle will be fitted with 1,000 fixed seats, and the choir will have the usual fittings for the bishop, clergy, and choristers. The architect is Mr. E. J. Blacket, for many years the colonial architect of New South Wales. The estimated cost is 16,000*l.*, but it is proposed to begin with nave and transept, costing about 12,000*l.*, towards which the committee have only obtained 3,500*l.* Aid is earnestly desired from the mother country, and either of the banking firms of Barclay, Bevan, & Co., Lombard-street; Hoare & Co., Fleet-street; or Ransom, Bouverie, & Co., Pall-mall, will receive subscriptions.



PROPOSED CATHEDRAL FOR GOULBURN, NEW SOUTH WALES.——Mr. E. J. Blacket, Architect.

THE CATHEDRAL OF LIMBURG.

The cathedral church of Limburg on the Lahn, in the now mediatised dukedom of Nassau, was originally a collegiate church dedicated to St. George, and belonged to the Cathedral of Treves. It had a dean and canons of its own, who were subject to the control of those of the mother church. After the treaty of 1815, the collegiate church of St. George was erected into a bishop's see, and it became the cathedral of a Roman Catholic diocese, comprising, and co-extensive with, the dukedom of Nassau.

Perhaps no church in Europe possesses so beautiful a site as that of Limburg. Standing upon a rock more than 100 ft. high, which is precipitous to the north and east, it looks down upon the beautiful river Lahn, which washes the base of this great rock platform on two of its sides, and upon an old town, a perfect marvel of picturesqueness, which gradually creeps up the other two sides, and by a number of crooked and steep streets connects itself with the church.

A church more suited for such a site could scarcely be imagined, it is a solid and massive late Romanesque building, and seems to be part of the rock upon which it stands; but as it rises it by degrees becomes more light and elegant, until the whole breaks into a magnificent group of seven spires.

The church was erected by Duke Conrad Courtsweg, of Nassau, who died in the year 1227, and whose remarkable monument is represented in the immediate foreground of our illustration. It is not a large church, being only about 220 ft. long, and about 150 ft. across the transepts.

In plan it consists of a nave of four bays, exclusive of the space between the two western towers, transepts each two bays deep, a choir of three bays with a semicircular apse. The aisle is carried round the apse, but there are no radiating chapels. There are, however, two small apsidal chapels projecting from the eastern side of the transept. The great feature of the exterior of the church is its matchless group of seven steeples, placed as follows:—two at the west end, both of which are noble square towers, gabled and capped with pyramidal spires; two at the end of each transept, which are somewhat similar to the western ones, only much smaller; and one over the crossing, consisting of an octagonal lantern, crowned by a very lofty slate spire.

Internally, the principal feature is the triforium, which is treated with great richness, and is still used as a gallery.

The ritual choir of the church crosses the transepts, and occupies one bay of the nave. The screens which enclose it are coëval with the church, and are adorned with pictures representing scenes from Our Lord's passion painted upon slabs of black marble. These, however, have been so frequently "restored" and painted over that it is impossible to say what they were like originally.

The church contains a very fine late Romanesque font of large size, and one or two curious monuments, of which the most interesting is that of the founder of the church, represented in our view. The costume of the effigy on this monument is very remarkable. The Duke Conrad is represented as dressed in a large kind of toga, and wearing on his head the Phrygian cap (or cap of liberty); in his right hand is a short bâton; round the cap is a coronet of precious stones, and on his hands are several rings.

The figures attached to the columns supporting the slab of this tomb are the most hideous grotesques we ever remember to have seen. What they are intended to represent it is difficult to say.

THE CATHEDRAL OF LIMBURG, NASSAU: THE FOUNDER'S MONUMENT.

A REVIEW OF WORKS ILLUSTRATED IN THE "BUILDER."*

LIVERPOOL ARCHITECTURAL ASSOCIATION.

Among the many remarkable works which have been in progress during the year, the buildings erected by Herr Guldenpfennig are particularly worthy of note. One of them is a range of farm-buildings erected at a place called Werver, near Paderborn, in Westphalia, for the Baron von Brenkin. These buildings consist of a gatehouse, two large stables, a large coach-house, harness-rooms, a cow-house, poultry-house, porters'-room, outdoor servants and coachmen's room. All these are in the lower or ground floor, which is constructed of stone worked roughly, and partially covered with rough mortar. In the upper story, which is framed in oak and filled in with patterns worked in red brick, are two large lofts used as granaries, divided from one another by the upper portion of the gateway, which forms a large apartment with two projecting bay windows. The roofs are covered with tiles made in the neighbourhood, the hips and ridges being ornamented with finials and crestings of lead and iron. The entire cost was about 900*l*. This, however, does not include the timber, which was supplied from the extensive woods belonging to the proprietor. The architect of this very pleasing and picturesque building has entered most thoroughly into the spirit of the Mediæval builders. In a district where timber is abundant there is an appropriateness in the erection of half-timbered structures, and it should ever be our study to embody our art in the native materials of the country.

Other examples by the same architect are given in the *Builder* of October 12th. They consist of a doorway and bow window, and a pair of folding-doors to drawing-room of Boeddeken Manor-house, Westphalia. These exhibit the same quaint feeling as before. The bow window is boldly corbelled out from the wall on cleverly designed timber brackets: above these the window is divided into five compartments with splayed and moulded uprights and transoms. The portions above transom heads are made circular openings, and are filled with stained glass. At the angle of the eaves is an iron gargoyle, or spout-head for discharging the water from the gutter, which projects far enough to throw the water clear of the building. The entrance-door, with its two-light fanlight and the two small flanking windows are thoroughly in accord with the work above, and the whole must form a very attractive bit in the design of the Manor-house. The drawing-room folding-doors are highly elaborate, and are treated with much originality. Unlike our English ones, they are seldom kept open, but, like the French, are only fully used when receptions are given. The whole opening is 5ft. wide, and on ordinary occasions only 2 ft. 6 in. need be open at one time. Great fondness for German and Latin inscriptions is shown in various parts of the building, and over these folding-doors, in German, is a legend, of which I give the translation:—"If the devil rules on earth to-day, God will be master to-morrow. A.D. 1871." The space above the doors is formed into two triangular crocketed canopies, filled with trefoil panels, and enriched with carved flowers, the background divided into narrow panels with shields. The doors themselves have two rows of chamfered and stopped linen panels, and two of small square carved panels splayed so as to form a circle. The doors are hung with large ornamental hinges. There is the same antique charm about these that seems to be possessed by all the works of this eminent architect. They are not mere copies and adaptations of mediæval work, but rather original designs by a thoughtful mind thoroughly imbued with the spirit of the past.

I wish now to call your attention to some school buildings erected by the Commissioners of the Royal Patriotic Fund at Wandsworth, Surrey. The cost was about 25,000*l*. The building is capable of accommodating 230 boys. The exterior is of red brick with Portland stone dressings. The plan is well considered, and may be divided into two parts; the right half being the portion appertaining to the boys, the left to the superintendent and the management generally. The entrance-porch conducts you into a commodious entrance-hall, 15 ft. square, with which the committee-room and office communicate. Beyond are the main staircases to the dormitories, the superintendent's private apartments, and the chapel. The boys' portion of the building comprehends large school-room, 70 ft. long, with two class-rooms and pupil-teachers' room, large play-room, lavatory, swimming-bath, &c. The part belonging to the management contains superintendent's room (well placed at the angle of the building to command the whole), kitchen, servants' hall, bedding and linen store, buttery, bread store, larders, dry goods store, &c. Close to the superintendent's room is a private stair leading to his apartments above. Only a portion of the buildings on the ground-floor is carried up two stories, and is occupied as dormitories. I want more particularly to draw your attention to the exterior elevation of the principal front, as given in our illustration. There is great breadth of character about this, which gives it much dignity. At the same time, great variety is imparted by the different treatment of the windows on each of the three stories. On the ground-story they are arranged in groups of two-lights and three-lights alternately, divided by detached shafts; on the first-floor stage, in a regular succession of arched openings; while on the second floor there are large bold dormers, which break up pleasingly the rigid line of the eaves. Much importance is given to the entrance-door, which opens into a bold and well-designed porch, and from the centre of the front rises the tower. This is kept quite plain to the height of the ridge line of the roof, with the exception of three small openings, and is then crowned with a belfry story, having deeply-recessed arched openings and angle buttresses. The tower is roofed with a slated spire in two stages, with crocketed angles. On each face of the lower stage of the spire is a small dormer. The ends of the façade are treated differently from the rest. Here are octagonal bow-windows carried up two stories, and a two-light window with a circle over on the third stage. I think you will agree with me that, considering the simple and plain character which the architect had necessarily to give to a school building, he has succeeded in imparting as much variety to it as was possible under the circumstances. The tendency at the present time is rather, I think, to do too much, and suitability to the purpose for which a building is erected is sadly too often forgotten by the architect, and the restless effort to produce something striking gives to many modern designs a disagreeable flutter and vulgar pretence. There is one other great element in the effect of this building which I wish to point out in the depth of the window reveals. These give a mass of shadow which adds considerably to the broad effect of the whole.

The Hull Dock Company's New Offices.—This building stands on a triangular piece of ground facing two streets and the Dock quay. Its plan consequently presented much difficulty, especially as a maximum accommodation was required upon a comparatively limited area. The entire building is faced with Ancaster stone, excepting the principal sculptures, which are of Portland, and the basement, which is of Bramley fall stone. Entering by the principal door, and passing through the vestibule, leading from which are a waiting-room and porter's room, the principal hall and staircase are gained. To the right, a corridor leads to the dock-master's office, connected with which are clerk's office and lavatory, &c. From the other side of the hall, another broad corridor gives access to the offices of the resident engineer, drawing-office, clerk's office, and resident engineer's clerk's office, conveniences for which are provided at each end of the range. The portion of the building facing the quay is occupied by the office for general wharfage department, with superintendent's office at one end. The dimensions of this large office are 88 ft. long by 30 ft. maximum width. It is amply lighted at the back by windows looking into internal courts. There is a separate entrance to this department in the centre of the curved façade to the quay. On the opposite side of the room is a passage communicating with large strong-room for deeds. The arrangement on the floor above is very similar to that on the ground-floor; the space over the wharfage department becoming here the proprietors' court, with directors' committee and retiring rooms at one end and ante-room at the other. The remaining portion of this floor is occupied with offices for the secretary and solicitor. The design of the exterior displays much skill and judgment. The Venetian style employed was thought to be appropriate to the situation of the building near the water's edge. Both the ground and one-pair stage are broken up with coupled pilasters between the windows, those on the ground-stage of the Ionic order, and above of the Corinthian. These give a great number of upright lines, which on the curved front are most valuable, tying together the irregular sweep of the curved horizontal lines, and giving also height to the building, which is helped materially by the lofty cupolas introduced over the circular rooms at each angle of the building. Each end of the fronts is treated more massively than the centre. Here the pilasters are omitted, and projecting piers broken up with rustics are carried the whole height of the building. These side projections give much stability and breadth to the design, besides which they contrast pleasingly with the columnar treatment of the rest. The small circular windows in the frieze relieve what would otherwise be rather a heavy feature, notwithstanding the elaborate carving with which it is covered. The entrance has much importance given to it by being boldly projected out from the front. Altogether, I think the architect, Mr. Wray, may be congratulated on having achieved a most meritorious work.

The Horton Infirmary, Banbury.—This building, an example of thoughtful planning, and of much quiet taste in the external design, was commenced in June, 1869, by Miss Horton, of The Holt, Middleton Cheney, and of Highbury, London, and was intended by her as a gift to the town of Banbury. She did not live to see the completion, which was effected by her grand-nephew, Mr. J. H. Horton. Mr. Charles H. Driver, of London, was the architect. The plan consists of a main building nearly 200 ft. long, with a projecting central block and two wings. The main portion contains the administrative department, and the wings, wards for men and women. A portion of the centre block of the main building only is carried above the ground-floor, affording accommodation for surgeon and matron. The whole of the remainder of the building is on the ground-floor, except the kitchen, which is obtained under the women's ward, with scullery, pantries, wine, beer, and coal cellars, with a lift to the ground-floor. The main entrance leads you to the matron's room on the right, and room for surgeon on the left, with staircases to bedrooms above. The entrance-hall leads into a broad corridor extending the whole length of the building, and communicating with the various departments of the hospital. Opening from the corridor is the operating-room, 20 ft. by 16 ft., with an open-timber roof, which is lighted by four large windows and a lantern-light. A gallery is provided at one end for students' use, under which are lavatories and sinks with hot and cold water laid on, as also to the sinks for the use of operating-room. There are waiting-rooms for men and women, and dispensing and consulting rooms, a room for convalescents, 16 ft. 6 in. by 14 ft., and room for hospital stores and comforts. The wings containing the wards for male and female patients respectively are each 48 ft. long by 24 ft. wide, and 16 ft. high, with fireplaces at each end, and lighted on both sides and at end. At one end of the wards, and having a direct ventilation from the external air, are lavatories, sinks, and bath-rooms; at the other end are ante-rooms sculleries, and nurses' rooms. The wards and rooms appertaining to them are plastered throughout with polished Parian cement, the dressings to the doors and windows are executed in cement, and the floors are wainscot, waxed over. The erection of the infirmary cost 6,200*l*. The exterior is, I think, a very successful composition, although hardly giving you the idea of an infirmary. At the first glance it would be taken for a group of school buildings. This fault apart, it is a good instance of an architectural character given to a building by very simple means. The walls are faced with red brick and black bands, and Box-ground stone dressings. The central block, with its slated tower, hipped roofs, and gable, presents a great number of sloping lines, which harmonise well together, and carry the eye upward to the highest point, and give a most effective sky-line. The elegant cresting of the tower, with its three finials, lends a satisfactory finish to the whole. The arrangement of the windows of this portion of the front is worthy of note,—two on the ground stage and one above, those above having dormer heads, which effectively vary the rigid line of the eaves. The wards, with their high-pitched roofs at each end, balance the composition, and they are very successfully treated. Their broad, simple masses contrast rather strongly with the broken-up character of the centre, but not more so, I think, than they should do, as they express one large apartment, while the centre gives, very properly.

* By Mr. W. H. Picton. See p. 271, *ante*.

the idea of a number of small offices, of which it is composed. The chimneys are brought up boldly to a considerable height above the roof, and break very advantageously the lines of the building. The gable-ends of the wards have large two-light windows, in a pointed arched bricked recess, with occasional stone voussoirs, which are ornamented with incised ornaments and bands of black brick. A stone label is carried round this arch. The window-lights are divided by a stone shaft, with foliage cap, and the tympanum of the arch above is filled in with a carved shield and foliage. On each side of these windows are small square-headed lights. One of the chief merits of the design is that it truthfully expresses externally its internal arrangement. In the central block, the five breaks in the front show the five rooms of which it consists; the corridors, with their unbroken series of windows, exhibit plainly what they are, and the wards are equally well defined. This element of truthfulness is sadly too often overlooked in modern architecture particularly in buildings of a classical character. The effort of the architect in these too often is to obtain symmetry and a perfect balance of parts, for which he will even sacrifice the arrangement of his plan, or build up useless features, in order to make the ends of his façade agree. But this is not worthy of the name of architecture. In the first case, it is putting the cart before the horse,—"delight before commodity and fitness"; and in the other it is a hypocritical sham. I am sure that if we would only express honestly and truthfully the character and features of the buildings we are called upon to erect, not bending to the style, but making the style bend to us, our art would develop and flourish in a degree of which we have little experience as yet. I do not for one moment wish to decry consistency of style, but consistency to the character and purpose of our building is a far higher and more important element, to which the other must give place. Combine the two where possible, but make the latter the first consideration.

I have now brought under your notice nine different examples of buildings which have been carried on during the year 1872. No one who looks into any architectural journal, and compares the works of the past year with those of an earlier period, can help being struck with the superiority of the former, and the marked improvement which has taken place in the productions of our art since these journals were first published. There is, I believe a growing disposition among architects to break the chains of precedent and tradition, to make less of style, and to go to the fundamental principles of truth and fitness, on which all architecture worthy of the name should be based. The fruit of this will be undoubtedly the ultimate formation of a new style, of which there are many evidences in the gradual fusion of the Gothic and Classic elements, which is seen increasingly year by year. Truth of construction, truth of material, truthful expression of the purpose of the building, truthful ornamentation,—these are now become the watchwords of the day, and they are words hopefully eloquent in promise for the future.

"Nothing," says Mr. Ruskin, "can atone for the want of truth,—not the most brilliant imagination, the most playful fancy, the most pure feeling (supposing that feeling could be pure and false at the same time), not the most exalted conception, nor the most comprehensive grasp of intellect, can make amends for the want of truth; and that for two reasons,—first, because falsehood is in itself revolting and degrading; and, secondly, because nature is so immeasurably superior to all that the human mind can conceive, that every departure from her is a fall beneath her, so that there can be no such thing as an ornamental falsehood. All falsehood must be a blot as well as a sin, an injury as well as a deception. We shall, in consequence, find that no artist can be graceful, imaginative, or original, unless he be truthful; and that the pursuit of beauty, instead of leading us away from truth, increases the desire for it and the necessity of it tenfold."

New Travelling Crane.—Mr. T. Grosse, a German engineer, resident in Manchester, has designed a new travelling crane, on an improved principle, the chief object of which is to prevent the danger from overturning, one of the most important defects in this class of machinery.

THE ROTUNDA FOR THE VIENNA EXHIBITION.

WE have already given some particulars and an illustration of the building erected for the Vienna Exhibition. Let us add a few statements made by the correspondent of the *Journal of the Franklin Institute*:—

Accurately stated, the exterior diameter of the Rotunda is 107·83 metres, and its height 84·1 metres. A rounded roof, supported upon thirty-one iron columns, 24·35 metres high, rises, with an angle of 31°, to a height of 48·2 metres, and is terminated by a central ring of 30·9 metres diameter. The exterior of the roof is covered smoothly with sheet metal, and, viewed from below, has the appearance of a smooth truncated cone. Upon this conical roof is placed a so-called observatory, composed, like the rest of the structure, entirely of iron, the outer diameter of which is 32·4 metres, and the height 10 metres. Upon this, finally, there is placed another building, 8 metres in diameter, and 18·5 metres high, which terminates in a crown, whose highest point is 84·1 metres above the flooring below.

At a height of 23 metres in the interior of the Rotunda there is placed a gallery, directly against the pillars, having a breadth of 142 metres. This may be reached by two stairways, on opposite sides of the Rotunda, or by two elevators, introduced for the purpose.

The entire space covered by the Rotunda measures 338·8 metres in circumference, and the surface covered by the roof measures 9,405 square metres, the interior circumference is 319·6 metres, and the space available for the purposes of the Exhibition and accommodation of the visitors is 8,129 square metres.

To give an idea of the forces operating upon the various portions of this structure, a few data are attached.

The vertical pressure upon one of the iron columns of the Rotunda = 109 tons. Pressure on the lower portions of the radial rafters = 211 tons; horizontal strain on same = 181 tons. Tangential strain on the lower roof ring = 863 tons. Pressure on the upper ring, upon which the observatory rests = 217 tons. The total weight of the structure of the Rotunda may be stated in round numbers at 80,000 hundredweight (Zoll centner), or about 4,000 tons. The pillars rest upon *béton* foundations, which were prepared for this purpose as early as October 30th, 1871.

THE DISPOSAL OF THE AYLESBURY SEWAGE.

THE report of Mr. Hawksley, C.E., for the disposal of the sewage of Aylesbury, has been discussed at the Local Board. Mr. Hawksley at once discards irrigation as unsuited to the physical and economical conditions which present themselves in the neighbourhood of the town. He also rejects the process of Mr. Bailey Denton, intermittent downward filtration, tried with so much success at Merthyr Tydvil; the soil, he considers, being insufficiently open and porous for this mode of treatment. With regard to the various proposals for a sewage-farm, he thinks that the suggested sites are all unpleasantly near the town. The remedy he proposes as the best and cheapest for the purification of the sewage is precipitation by quick-lime, which he states has been adopted with entire success at Birmingham. He proposes the establishing at Heydon Mill of clarifying and precipitating works, sufficient for the immediate treatment of half a million gallons of sewage daily, and capable of easy enlargement if necessary. He estimates the probable cost at 6,000*l*., inclusive of land and compensation; and the annual working expenses at between 250*l*. and 300*l*. The precipitated matter, he considered, would possess a market value as a manure, and would be readily bought by farmers, but the price it commanded would not be sufficient to cover the expense. Several members of the Board stated that the proposed site would be difficult to get to; that a road would have to be constructed; and that, in addition to the cost incurred thereby, there was also the sewerage of the town, which had not been included in the estimate, and they calculated the whole cost at not less than 12,000*l*.

It was decided to obtain from Mr. Hawksley an approximate estimate of the total outlay, and then to submit the scheme to the ratepayers at a town's meeting.

MATTER OUT OF PLACE IN IRELAND.

CONTEMPORANEOUSLY with the agricultural demands for *the matter* that has been sadly out of place for months past amid the purlieus as well as in some of the more favoured parts of Dublin, some action appears to have been taken by the Dublin authorities towards compelling persons guilty of polluting the atmosphere of that city to remove their noxious accumulations. This is what we have before observed repeatedly,—namely, a show of action at a time when those proceeded against would, in any case, have found it their interest to clear out their filth to meet the demands of the farmer for spring tillage. But this is not all: full time is being given for those traders in the aggregations of foul matter who have been proceeded against to remove the same with due leisure to secure their own gains. Nevertheless, in the next official stock-taking, so to speak, all such spring cleansings will be duly noted down, and credit taken for, as the results of official action.

It is scarcely necessary to say that the very unsatisfactory state of the public health in Dublin demands a much more decided and thorough mode of dealing than such make-believe proceedings, which but create a false impression among those who do not inquire into what deeply concerns themselves, but take official reports as evidence of work done. We have before shown the amount of mortality and the comparatively small birth-rate of Dublin, which together account for the fact that the population of the Irish metropolis has actually diminished of late years. The poor, and especially the very young and the aged, are the chief sufferers; but many heads of families, many bread-winners, also succumb, adding seriously to the amount of taxation of a local nature, which now amounts to almost 10s. in the pound of the valuation.

Within a few days past, two medical men, engaged in the active practice of their useful profession, perished,—one by fever, "caught, doubtless," * in the discharge of his perilous calling, at the early age of thirty-one; and the other, aged about sixty, but who had for years suffered from the effects of a fatiguing and riskful profession, and who, but a few days before his death, was heard advocating improved sanitary measures for the poorer parts of Dublin, died almost suddenly, in the midst of his professional work.

A third medical man lost his life in the following manner:—returning home late at night from a patient's residence to the town in which he lived, he was thrown from his vehicle, which was upset by a large heap of manure, that a farmer had placed on the highway for the more easy removal to his land next day. When the mischief was done the constabulary assisted the doctor home,—only, however, for him to die of the injuries he received within a few hours, unconsciousness having almost immediately set in.

Agriculture is an important industry, but it should not be supposed that those who practise it are to do so to the damage either of themselves or others, whether we regard the work of collecting and storing manure, rearing pigs, and stall-feeding dairy cattle in Dublin and other large Irish towns, or the means adopted in some country towns and on the Queen's highway for facilitating the labour of the farmer.

Where such matters are so plainly fraught with danger, and even with fatal results to the public, it becomes the duty of the State to intervene; nor shall we be surprised if measures be taken by the surviving family of the deceased medical gentleman (he has left a widow and nine young children unprovided for) to recover commensurate damages.

In like manner, we cannot but think that it is time a coroner's inquest should be held in all cases fatal from fever arising in apparent relation to causes in Dublin, such as we have referred to as so common in that city. In the words of the *Freeman's Journal* (of 25th ultimo), "For a score of years, the month of May has been signalized by little less than universal quake; for as the thermometer rises, disease and death stalk boldly out from the noisome dens in which they have lain hidden. The summer-time has been shorn of half its glories by the gloomy reapings of the King of Terrors, to whom fever, cholera, and small-pox bring a woeful harvest."

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* As recorded in a morning contemporary published in Dublin.

DILAPIDATIONS DISCUSSED.

After the reading of a paper "On Dilapidations," by Mr. Banister Fletcher, at the Architectural Association on the 4th inst.,—

Mr. L. W. Ridge, in speaking on the subject of ecclesiastical dilapidations, said that their nature could be more readily explained by reference to their contrasts with other dilapidations. The holder of a benefice is to all intents and purposes an owner for life, subject to certain limitations. He is not to allow property to suffer either from injury or neglect in any way affecting the fabric. He is bound if a house or other building falls down to build it up again as before. No allowance can be made for wear and tear: he must make good any want of repair during his holding, or must pay at the end of it. If a floor, for instance, is very generally and seriously worn he must put a new floor; it will not be enough to renew broken and damaged portions as in lay dilapidations. Painting must be renewed when it is necessary for the durability of buildings, as on perishable woodwork, &c. It is thus doubtful whether, in any case, painting or colouring on external cement work can be demanded. But while the liabilities of an incumbent are thus greater with respect to matters of structure,—than are those of tenants under ordinary leases with repairing covenants,—the incumbent is under no obligation to keep up to any high standard of tenantable repair. Decorations and finishings do not come into notice at all. He is not called upon to do internal painting, papering, whitewashing, or colouring. The recent Act has in no way altered the general principles previously established. It has been framed for the purpose of easing off things that, in practice, worked hard on some incumbents. It facilitates the obtaining permission to alter and amend buildings, making them suitable for modern requirements, or the average wants of the incumbent of the living. Charges may be made with less trouble on the revenues of the benefice for desirable and approved works. Perhaps, however, the most important provision is that which enables an incumbent to amend his buildings to the satisfaction of the surveyor for the diocese,—receiving, when the works are completed, a certificate which relieves him from liability for five years from its date, except for a wilful (voluntary) waste. Insurance against fire is arranged for also by the Act. The value of the relief that may thus be obtained by incumbents can be judged when it is called to mind, that aforetime everything on the lands of the benefice was to be kept up that was proved to have existed within reasonable memory; a matter depending on testimony involving vague, sometimes considerable, liabilities. The surveyor in lay dilapidations represents an individual owner having reversionary interests; the surveyor under the Ecclesiastical Dilapidations Act practically represents (Mr. Ridge said, in answer to a question from a member) the ultimate owner of church property.

Professor Kerr called attention to the provisions in Lord Selborne's Bill, now before Parliament, for the appointment of permanent assessors attached to the Courts of Judicature, to whom is to be entrusted the decision of questions of fact, instead of to a jury, as at present. This will, if made law, probably secure intelligent decisions on complicated questions of a technical kind,—among which will be the too often very imperfectly comprehended questions involved in trials as to dilapidations. On the matter of covenants in leases, on which something had been said by previous speakers, he endorsed all that could be put forward as to the inefficiency and frequently the gross injustice of the repairing clauses,—copied regularly into new leases, and accepted by lawyers completely ignorant of their meaning. The real intention of the bargain between a good landlord and a good tenant is that the property shall be used fairly and kept up fairly, and no more. The only reason why people accept the unreasonable terms of leases without question again and again is, that they are rarely insisted on,—never by landlords who wish to act as they ought: if they were, there would be brought about a complete change, and lessees would have leases that embodied precisely the intentions of their bargains. The covenant to paint internally once in every seven years, on pain of forfeiture, Professor Kerr considered most ill-advised. Much internal grained work, and plain painting, even, if carefully used, requires no such renewal. It would be mere waste and annoyance. In cases where this and other similar covenants are taken advantage of by grasping or unprincipled landlords pressing for forfeiture or costs, the hardship suffered and wrong done to their unfortunate tenants provokes indignation in right-thinking people.

The president, Mr. J. D. Mathews, spoke of the necessity of some arrangement by means of which the provision of so many months' notice could be adjusted to suit the case of a lessee and his under-lessees. A sub-lessee usually holds under the same covenants as are in the original lease from a freeholder;—why should the lease be forfeited if repairs are not completed by the time specified in the notice to the original lessee? He also spoke of the obvious injustice of a lessee being responsible for the acts of his assignee, contending that a certain lapse of time should free him from liability, especially where the assignee has been practically, even if not formally, recognised.

Mr. Fletcher, in reply to the thanks that had been voted to him, alluded to the various points that had been raised. Particularly with reference to the question of forfeitures, he stated that all that could be wished for as a measure of practice would be attained if compliance with the covenants and payment of the expenses incurred in an action always put an end to any claim for forfeiture. The insurance clauses in leases are thus affected by an Act passed a few years ago; there is no good reason, he said, why the repairing clauses should not be similarly dealt with. He also insisted on the justice of always scheduling a description of buildings, their age, their noticeable defects of structure, &c. This could easily be done if once made the custom, and the effect of it to lessees taking over old or improperly built structures must be obvious. He was glad to agree with previous speakers who had advocated such a course.

IMPROVED DWELLINGS FOR THE POOR, AND UNREMUNERATIVE RENTS.

At the meeting of the Special Dwellings Committee of the Charity Organisation Society, held on Wednesday, the 2nd inst., Mr. Thomas Hughes, M.P., in the chair, an interesting discussion took place, "On the Influence of Unremunerative Rents on the Movement for Improving Dwellings."

Mr. C. Gatliff, representative of the Metropolitan Association Dwellings Company, enlarged upon the importance of the Peabody trustees and others who built for the poor, taking care that only those were admitted into their houses who could not help themselves. A clear line ought to be drawn between associations working on commercial principles and associations working on charitable principles. So long as this was not done, the charitable associations drew away tenants from other improved dwellings. He moved the following resolution:—"That the influence of unremunerative rents on the movement for improving dwellings, unless confined to the less fortunate, or classes not earning more than 20s. a week, will seriously affect, by competition, efforts based on commercial principles, which are essential to ensure the extensive improvement and permanent success of the movement."

Mr. Easterwick, M.P., inquired of Mr. Gatliff the principles upon which his society acted.

Mr. Gatliff, in reply, stated that the Metropolitan Association was restricted by its charter to a dividend of 5 per cent. They had power to set aside 15,000*l.* for equalising dividends, but further sums were to be applied for advancing the objects of the association.

Sir Charles Trevelyan observed that most great enterprises in England had an element of public spirit in them. It had been so in the establishment of steam communication with India, and of telegraphic communication with America. He saw no occasion for charity to any greater extent than this. The necessary work could only be done on the commercial footing. There was danger of perpetual conflict between those working on charitable principles and those working on commercial principles. All associations should let at the market rates, with the full conviction that they were doing the best for the masses. They would then make it known that the undertaking was a highly profitable one. It was in the nature of things that those should be first provided for who had made the best of their opportunities. Room would thus be made for those below them. He moved, as an amendment to Mr. Gatliff's motion, "That commercial and charitable principles cannot be carried on concurrently in the reconstruction of the sordid parts of London without mutual conflict and obstruction."

Mr. Eastwick, M.P., hoped that the commercial principle did not mean letting houses in a filthy condition to the largest number who could crowd into them. The masses, who could not or would not help themselves, must be educated and helped. Still, the work could not be done on eleemosynary principles.

Dr. Greenhill understood the commercial principle to mean getting a fair return for money, and not an exorbitant return. The insufficient returns obtained by some societies had discouraged people. Each instance of comparative failure had done harm. He was not prepared to say whether the working classes who earned the lowest wages could pay enough to get proper accommodation.

Miss Octavia Hill thought there was a deeper reason against unremunerative rents than had yet been given. The ultimate result would be to lower wages, and to keep a large class dependent on charity. Improvements must be made gradually, and the poor must be educated up to them. She believed that they might be made to pay.

The Rev. G. M. Murphy had no doubt that the Peabody trustees did their best to make correct inquiries. It was very difficult to select the right class.

Dr. Ross remarked that the commercial principle would prevent people building better houses than there was a demand for. He did not see how the very poor were to pay for sufficient accommodation.

Mr. Storr thought that the object of the committee should be to stimulate the authorities. The metropolis was in an anarchical condition. The work of charitable associations was a drop in the ocean; but until there was effectual government in London, and the power to remove buildings not fit for habitation, the evil could not be effectually dealt with.

Mr. Bosanquet suggested that power might be given to the Peabody trustees, to take houses not fit for habitation at a valuation. They had no private interest to serve. He failed to see how the distinction which Mr. Gatliff wished to establish between the charitable and commercial associations was to be carried out.

The Chairman was of opinion that the commercial principle was the only one that could be relied upon, with certain limitations, that building should be well done, and each class of houses good of its kind. There should be just enough inspection to check overcrowding, and secure repairs. Some rise in rents could not be prevented. If wages did not rise it was the fault of those who gave charitable doles. They should not play into the hands of those who were grinding the poor down. Subject to these conditions, the only solution of the question was to build good houses, and let them to those who would pay the full market value for them. It was the highest charity to make people independent.

Mr. Gatliff's motion was then rejected, and the amendment of Sir Charles Trevelyan carried by a majority of 12 to 4. The committee adjourned until the 23rd instant.

IMPROVING HOUSES.

In our last volume we described the miserable condition of three dwelling-places in Great St. Andrew's-street, Seven Dials, which had been taken on lease by the Society for Improving the Condition of the Labouring Classes, with the intention of repairing and rendering them fit for healthful habitation. On Thursday in last week a meeting of friends of the Society was held on the premises, Lord Shaftesbury presiding.

Mr. Payne, the excellent secretary of the company, read a report which gave a clear and succinct account of the whole transaction, showing how it had been brought about by the gifts of several individuals; that the cost of making the houses sound and comfortable had been from 1,000*l.* to 1,100*l.*; and that the rentals would give a return of about 6 per cent. on the outlay. The ground floors were fitted up as shops; the upper floors were let to families at a lower rent than used to be paid in the old building.

Lord Elliot moved a resolution to the effect that the report be adopted, that the subscribers be thanked, and expressing a hope that the work of the society in making this renovation would be followed in other parts of London. He said there were not only many houses in London unfit in themselves for human habitations, but

many more unfit by reason of their surroundings and the localities in which they were placed, reminding him of Thackeray's "Codlingsby," who had a mansion of Oriental magnificence in Holywell-street. It was with some a cheap and easy way of accounting for the wretchedness of some wretched dwellings by abusing the owners of the property; but it should not be forgotten that the law did not enable all landlords to sell. It was impossible to greatly improve the part of London in which they were met as the property now stood. He thought, in efforts of this kind, decent houses should be built of various sizes, as some of the very poor could only pay 2s. or 2s. 6d. a week; but he feared, that to effect much good there must not only be private organisation, but a legislative enactment for the compulsory purchase of land in certain cases.

Mr. Godwin, being called on to second the resolution, spoke of the overcrowding in many parts of London, and the evils resulting from it. A map had recently been published which showed that in London proper twenty acres had been recently cleared of houses for railways and other public works, and that twenty acres more were scheduled in new Bills for removal. There were enormous funds at command for the improvement of the condition of the working population, if rendered rightly available; and he urged on statesmen of all denominations that it was the great question of the day, and demanded the most serious consideration from all. No nation could be prosperous with a decaying people. There was surely nothing more valuable than human life,—nothing more precious than an immortal soul,— and this question concerned both.

After the adoption of the report,

The Rev. Canon Nesbit, rector of St. Giles's, moved a vote of thanks to Lord Shaftesbury for presiding, and contended that drink was the great cause of crime, and that drinking was itself largely caused by the pestilential air of the dwellings, which drove a poor man out. Where was there for him to go to but the public-house, where he would drink one glass for the good of the house and perhaps many to the harm of himself? They did not wish to turn the poor out of St. Giles's, neither did they wish to do away with their independence by wholly eleemosynary aid; nor, on the other hand, did they want to achieve a great financial success. He thought they might do some philanthropy in a business spirit, and, by taking up the case of such houses as these, obtain a reasonable return for their money.

The Hon. William Vernon cordially seconded the motion, not only in his individual capacity, but as secretary of the Charity Organisation Society. This movement, he feared, could only palliate the evil complained of; unless legislation assisted them more, its removal was hopeless. In that room, for instance, supposing it to be occupied by a family, and the father sickened and died of an infectious disease, what would become of the children? On this point—the disposal of the body between death and burial—he had to inform them that a scheme was now afoot for a public mortuary for the poor of Drury-lane and part of St. Giles's, and that the Vestry of St. Martin's had granted a site available in Drury-lane.

The vote of thanks was then carried unanimously.

The Earl of Shaftesbury, in acknowledgment, congratulated the Society on what they had accomplished; and said no one could form any idea of the filth, the stench, and the vermin in these houses a year ago, without actually witnessing it. He quite agreed with Lord Elliot that such renovations as this were only a part of the object aimed at. But the state in which they left the houses was very much better than their former state; they had, at any rate, made it possible for families to live there in decency and in the practice of Christian duties. They must bring commercial principles to their aid. The renovation of London would cost ten millions sterling, and could never be effected by the philanthropic principle alone. The displacement of the poor going on in London, as Mr. Godwin had shown, was enormous. From railway Bills, which had to state the numbers of houses and persons to be displaced, it was calculated that since 1852 the average displacement of the very poor in England and Wales had been 50,000 a year. During a large displacement in Westminster many crossed the river, and some who remained had to pay double price for their wretched lodgings. Referring to the renovation of Tyndal's-buildings by the Society, the chairman described the condition of the court as so bad that the workmen struck work on account of the vermin, and as sending twenty-two fever cases to the hospital in a year. Since the alteration no fever case had occurred; and the conduct as well as condition of the people had very much improved, according to the statements of the police. Changed domiciles would soon make a changed population. He trusted that the example of this society would be imitated in many other parts of London; as certainly many would thereby be extricated from misery, and a condition of things altered which was now a degradation and a disgrace to the metropolis.

The condition of the houses when Mr. Eyton, the Society's architect, began the work, was found to be even worse than we had described; some of the walls were hanging up by the eyebrows, and might have collapsed at any moment.

THE NEWINGTON VESTRY'S DEPÔT AND MORTUARY AT WALWORTH.

FOR some time past the Newington Vestry have been engaged in the construction of extensive premises, at Walworth, which are intended to serve the several purposes of a road-scrapings and dust depôt, a stone-yard, cart-sheds, store-rooms, offices, and stabling, together with a mortuary, for the use of the parish. These premises, which have been constructed at a large outlay, are now fast approaching completion, and will be fully opened and utilised for general parish purposes in about a fortnight from the present time.

The premises, which are situated between Manor-place and Penrose-street, on the west side of the Walworth-road, and which are intersected by the London, Chatham, and Dover railway (the two sections being connected by the arches under the railway), occupy altogether an area of between two and three acres in extent. The land upon either side of the railway, upon which the depôt has been formed, was purchased from the railway company by the vestry, who have also leased from the company seventeen of the railway arches. For the purpose of removing the dust and street sweepings into the country by railway, a timber siding for a stand of twenty-eight trucks has been erected alongside the railway, at an elevation of 20 ft. above the yard level of the depôt. The dust and street sweepings will be raised from the depôt to the railway trucks by means of a steam crane on the railway level, drawing up skips containing the dust and refuse. The railway level of the siding contains a fantail for removing the trucks from one set of lines to the other; also a timber staging or jetty for the steam crane under which, sunk below the paved surface of the depôt, there are eight pits and hoppers, built at an equal distance from the centre, and formed in a circle round the jetty, so that the skips fit into them. Two of these skips are for the reception of dust, and the other six for shooting road-scrapings, and a complete set of tramways is laid throughout, and facilitate the removal of the various materials from point to point, until they are finally discharged by the steam crane into the railway trucks. This portion of the work has been executed by Mr. Ritson, the contractor; the plans for the railway timber siding, steam crane, and other works in immediate connexion therewith, having been prepared by Mr. Mills, engineer to the Chatham and Dover Company.

The arches under the railway have been fitted up, three of them as stables for fifty horses, and others as cart-sheds, store warehouses, and offices, the contractor for this part of the work being Mr. Cook, of Walworth-road, builder.

The entire area of the depôt has been drained and paved on a bed of concrete, and in laying out the levels of the depôt, a scheme of slop drainage and slop filter-beds has been adopted, in which provision is made for the drainage of 1,000 loads of slop, or the depositing of 5,000 to 6,000 loads of snow. This portion of the works has been carried out by the workmen of the vestry, according to plans prepared by Mr. Gledhill, the surveyor of roads to the parish. This method of slop drainage is an experiment, and it is expected that under its practical operation a saving of upwards of 500*l.* a year will be effected in the cost of conveyance and loading.

One portion of the depôt will be set apart as a store-yard for drain-pipes, bricks, lime, stone, and paving materials; another portion for the road-sweepings or slop just referred to, and the remaining portion for dust. A boundary-wall, 8 ft. high, encloses the entire area, which has just been planted all round with trees.

The mortuary, which forms a portion of the establishment, is not the least important feature in the works. It is situated at the extreme end of the depôt, separated from the rest of the premises, and approached by a gateway altogether distinct from the rest of the establishment. The dimensions of the mortuary are 25 ft. by 20 ft., and it contains a room for dissecting and *post-mortem* purposes, fitted with the necessary slate slabs and tables, sinks, and drainage, and has a concrete floor, with Portland cement surface. One of the railway arches, which immediately adjoins it, has been converted into a disinfecting-room, the dimensions of which are 50 ft. by 25 ft. It has been fitted up with a complete disinfecting apparatus, containing all the latest improvements in connexion therewith. The arrangements of the mortuary and disinfecting-room are such that the hearses containing bodies, or carts containing materials requiring disinfection, can draw at once out of the premises without causing any nuisance to the neighbours. The works connected with the mortuary and dissecting-room have been executed according to plans prepared by Mr. Hardy, the surveyor of sewers to the vestry; and have been carried out under his superintendence.

The estimated cost of the depôt and mortuary, which is intended to be very complete, is upwards of 7,000*l.*, exclusive of the land.

ENGLISH BUILDINGS FOR LEGHORN.

A CORRESPONDENT informs us that the municipality of Leghorn, with a desire to improve and add to the inducements to strangers on the Continent to visit and stay at Leghorn, are about to grant to a party of English gentlemen the concession of a large tract of land in the best portion of the town, just outside the city walls, which will be so extended as to inclose it. This piece of land, on part of which formerly stood the barracks, has a sea frontage on three of its sides, the fourth side facing the Corso. The object of the municipality in making this concession, is to enable these gentlemen to create a winter season in Leghorn, by erecting a superior class of house, built, as is usual abroad, in flats, but containing those comforts and requirements which are necessities to the English, American, and other visitors. An esplanade will be built all round the sides facing the sea; and on that looking toward the Island of Gorgona is to be erected a large hotel, with suites of rooms, replete with every English convenience, such as fireplace, good ventilation, and good bath-rooms, &c. On one of the remaining sides, facing the sea, will be erected a club-house, which will be conveniently situated for gentlemen cruising in their yachts in the Mediteranean. On the other side there will be a kursaal. On the rest of the estate it is proposed to erect villas, as before mentioned, so far embodying the foreign principle that they will be constructed to be let in flats, but each flat will be furnished in such a manner as to combine all the requirements and comforts of an English home, with the beauties of an Italian climate.

The price of land in this portion of the town is increasing very much in value, and in the case of that opposite the estate in question, the value has gone up over 50 per cent. within the last twelve months. An architect has already been to Leghorn to make a report and survey, as well as to aid in carrying out the necessary negotiations. The misfortune is that Italian authorities are hard to deal with: an English company would have to keep all its eyes open.

CONSTANT WATER SUPPLY.

IT is gratifying to know that a serious grievance, which the inhabitants of London have long had occasion to complain of, is in course of being at least partially redressed: we refer to the intermittent and often greatly defective supply of the prime necessary of life—water. From the last report of Major Frank Bolton, Water Examiner for London, it appears that progress is being made by several companies in the provision of constant supply. During the past year the Lambeth Company have given constant supply by means of stand-pipes, in a number of courts and alleys, to about 460 houses, and have made arrangements to give a like supply to about 5,000 houses of a similar class. The alterations in fittings under the new rules and re-

gulations of the Board of Trade are being gradually effected as occasion permits, and they are being carried out in all new buildings. The Grand Junction Company are constructing near Kilburn a high-service reservoir, the work being well forward, that will contain 6,000,000 gallons. The West Middlesex Company have recently given constant supply to 100 houses on the application of the owners, who have provided fittings in conformity with the regulations of 1872. The company is fully prepared to extend the constant supply when called upon to do so. To afford means of giving constant supply, the company is providing additional engine-power at Hammersmith and at Hampton. The Southwark and Vauxhall Company are constructing, at Nunhead, a reservoir to contain 18,000,000 gallons, to enable them to provide a constant high-pressure supply. The works are being prosecuted vigorously. The East London Company have given notice that, from the 25th March, they will give constant supply to the part of their district bounded on the north by the Hackney-road, on the south by Church-street, Bethnal Green, on the east by Cambridge-road, and on the west by Shoreditch. The district indicated embraces 205 streets, 6,328 houses, and about 40,000 inhabitants. Ferrules have been used hitherto to restrict the supply, but their use will be discontinued, as contrary to the orders of the Board of Trade of 10th August, 1872. The New River Company have provided additional steam power, mains, and high-service reservoirs, as required for the high-pressure constant supply of the Metropolis Water Act, 1852. After the passing of the Act of 1871, the company undertook the construction of a new service reservoir at Highgate, 336 feet above Trinity high-water mark, as further addition to their power of affording effective constant service. This company also has afforded constant supply in a number of cases by means of stand-pipes, and they have recently agreed with a committee of the Corporation of the City of London to furnish constant supply at once to a large number of the houses of the poor within the City bounds, and are now only waiting the arrangements of the officers of the Corporation to carry this design into effect. The Kent Water Company are also stirring in this matter, and have given notice that from the 1st of June next they will give constant supply to about 1,000 houses in Rotherhithe, Deptford, and at New Cross. It is necessary to say that other statements are made by some less friendly critics.

The East London Company has now storage reservoir capacity at Walthamstow for 360,000,000 gallons, the reservoirs having an area of 220 acres. The engines that are being provided by the West Middlesex Company at Hampton and Hammersmith are the one of 120, the other of 135 horse power, each having a 68-inch cylinder. Extensive new works have been ordered by the Chelsea Company that are not likely to prove obnoxious, as were their proposed works at Hampton Court.

STATUES FOR THE SCOTT MONUMENT.

ABOUT two years ago a movement was set on foot by Mr. James Ballantine, for the completion of the Scott Monument, by the fitting up of its interior as a museum, and the providing of statues to fill the niches which diversify its external surface. The former object has been attained, and the latter is now in course of realisation. Of the statues required to fill the numerous niches, says the *Weekly Scotsman*, the committee charged with the undertaking found themselves in a position to commission sixteen, as a first instalment, and these, in the hands of the various sculptors intrusted with them, are for the most part either finished or rapidly approaching completion. To Mr. Wm. Brodie, R.S.A., four subjects were assigned, the same number being allotted to Mr. John Hutchison, R.S.A., while two each were given to Mrs. D. O. Hill, Mr. Clark Stanton, A.R.S.A., Mr. D. W. Stevenson, and Mr. Lawson, London. It was provided that the figures should be of a uniform height—something just under life size—and that all should be hewn out of Binnie freestone in a style of execution adapted to the elevated positions—some 15 ft. to 20 ft. above the ground—which they are intended to occupy. Mr. Brodie's statues illustrate the "Heart of Mid-Lothian,' and "Kenilworth." From the former novel there is Jeanie Deans, in homely attire, and small bundle in hand, as she took the road on her mission of mercy. Jeanie's eccentric admirer, Dumbiedykes, forms a companion subject, hands crossed in front, and head to one side, with a wistful look as he ejaculated "Jeanie, Woman!" "Kenilworth" furnishes the Earl of Leicester and Amy Robsart. Mr. Hutchison gives illustrations of "Waverley" and the "Fair Maid of Perth." Mrs. D. O. Hill's subjects, taken from "The Pirate," are Magnus and Minna Troil, the former a venerable figure in flowing cloak, with hands on a staff. Mr. Clark Stanton, to whose lot "Ivanhoe" has fallen, gives us a stately Rebecca, with waves of rich hair rolling down upon her shoulders, and a countenance full of dignified composure. In dealing with Friar Tuck, Mr. Stanton has departed from the ordinary pot-bellied ideal, and has modelled a stalwart figure with frank jovial expression, holding in his hand an antique drinking-horn. Mr. D. W. Stevenson illustrates "The Abbot" with a statue of Mary Queen of Scots, and one of Halbert Glendinning. Mr. Lawson had assigned him Diana Vernon, the heroine of "Rob Roy," together with Bailie Nicol Jarvie. The Bailie stands with one hand in the pocket of his deep waistcoat, and the other fumbling at his long cravat, as while exclaiming "My conscience!" In addition to these statues, there are being prepared by Mr. Hutchison a series of heads in alto relievo, intended to be cast in bronze, for the decoration of the interior of the monument.

THE TRADES MOVEMENT.

Liverpool.—The differences between the master painters of Liverpool and the operatives have been adjusted. The men claimed 7½d. per hour for 54 hours' work per week, which was rejected by the masters, who offered 7d. per hour for a week of 55 hours, being an advance of a ½d. per hour upon the existing wages. The men declined these terms, and after several meetings of joint representatives, it was decided to refer the matter to the arbitration of Mr. Clarke Aspinall, the borough coroner, and a local magistrate. Mr. Aspinall's award has been received by Mr. Hugh Shimmin, the Secretary to the Master Builders' Association. It is in favour of 7½d. per hour for a week of 55 hours. This, it is expected, will finally settle the matter.——The building trades of Liverpool have recently been in an unsettled state in consequence of the disputes with the house carpenters and joiners of Liverpool and Birkenhead. The men claim an increase of wages, and a reduction in the hours of labour, which practically involve an increase of pay amounting to 2s. 4d. per week, with five hours' less work. No positive change, however, can take place until the 1st of May, as both parties on the 1st of November last bound themselves to give six months' notice of any change. The men have already rejected a proposal of the masters to increase the wages by ½d. per hour without reducing the hours.——At a large and influential meeting of master joiners, held at the rooms of the Master Builders' Association, Mr. Rome in the chair, called to take into consideration the advisability, or otherwise, of leaving to arbitration the dispute between the masters and the operatives on the wages question, a resolution was passed "unanimously and emphatically declining to go to arbitration upon the present trade rules." This resolution was arrived at in consequence of it being considered that the offer made by the employers in February last was a most liberal one in the present state of trade. A general strike in the building trade will probably take place on the 1st of May, unless the men forego their claims for further concessions.

Leeds.—The plasterers' labourers, numbering about 100, have struck work, their masters not having conceded their demand of 6d. per hour. Hitherto they have been paid 5½d. per hour. A meeting of the employers has been held for the purpose of considering the matter, and the result of their deliberation was a unanimous determination not to increase the rate of wages.

Leamington.—The operatives in every branch of the building trade at Leamington have struck. Through the local trades' council, they some time ago served notice on the masters for shorter hours and increased pay. They stipulated 54 hours instead of 56½ hours should be a week's work, and demanded an increase of wages, ranging from a farthing per hour for labourers to seven-eighths of a penny for carpenters. The masters formed an association, embracing the whole trade, and served counter notices on the men, to come into operation, adhering to the old wages, but making alterations in hours for beginning work. The men proposed arbitration, but the masters intimated that they should make no concessions. It is calculated that about 800 men have struck.

Wednesbury.—At a special meeting of the members of the Operative Bricklayers' Society the following resolution has been unanimously adopted:—"That an increase of ½d. per hour in summer (7½d.), and 1d. per hour for twelve weeks in winter (8d.), for red brickwork; also, 1d. upon furnace work, at 1s. 6d. per hour, and 1d. upon ditto at 1s. per hour, allowance to remain as previous,—be requested." It was also decided, "That the notice of 1872 be rescinded, and that all future notices be given on the 1st of April, to take effect on the 1st of May in each year."

Woodhouse.—The master builders of Woodhouse and Handsworth have conceded the following, being a part of what was asked for the operative masons in a notice recently given: "To begin at half-past six instead of six in the morning, and an advance of 2s. per week on their wages.

Glasgow.—At a meeting of Glasgow joiners it was reported that eighty-six employers had consented to accede to the demands of the men for an advance of ½d. per hour; twenty promised to pay the advance if the trade generally did so; nine had refused, and four had not yet given any decided answer. As the nine masters who decline to give the advance employ very few hands, the threatened strike will be averted.

Arbitration is working successfully in the provinces. It has just averted two great strikes in the building trade, one at Liverpool, the other at Birmingham. Mr. Clarke Aspinall, as we have seen, has decided the Liverpool case in favour of the men as regards wages, and of the masters as regards hours. Only the first part of the Birmingham award has been given,—that settling the hours; the decision as to pay was expected shortly.

Mr. Rupert Kettle, to whom was referred the question of wages in the North of England iron trade, has declared that puddlers shall receive an advance of 9d. per ton, and that all other ironworkers shall be paid an advance of 7½ per cent. on present prices. This decision was communicated at a meeting of the Board of Arbitration at Saltburn.

NATIONAL MONUMENTS.

SIR,—Having read Mr. C. Cooke's remarks in your paper of the 29th ult., under the heading of "National Monuments," I am at a loss to understand the harsh expressions used from time to time by gentlemen who profess much veneration for notable stone relics. I have before, in the *Times*, mentioned certain particulars respecting the Tôlmen Rock, in Constantine, Cornwall, and I would suggest that when a relic is offered to the country at large for a mere nominal sum (as was the case with the Tôlmen Rock), there should be an effort put forth to purchase the rights to such monuments before any person or persons give expression to censure.

The Tôlmen was the key to large masses of beautiful granite rocks; and although it was thrown down after working-hours, unknown to me, yet I maintain, had I ordered its destruction, it is not becoming in any one to question the action of a proprietor with respect to a monument or relic, when he has had the opportunity of purchasing all rights to the same.

Penryn. WM. HOSKEN.

IN the *Gentleman's Magazine*, May, 1844, pp. 483, 488, reference was made to various destroyed stone monuments in Cornwall, near Penzance; and it was stated that the late Sir Charles Lemon, of Carclew, offered a reasonable price for the Constantine Tôlmen, and the land on which it was placed. The then owner demanded 500*l.* as purchase-money, which Sir Charles declined to pay. Dr. Borlase deemed it to be a rock idol, and engraved it in his work upon the Antiquities of Cornwall, 2nd edit., p. 147. This relic, when I inspected it in May, 1861, was ominously near a stone-pit, as the Cheesewring is now. The Rev. R. Polwhele, when vicar of Manaccan, distinctly saw the Eddystone light from the Tôlmen, some fifty miles distant as the crow flies! The fine cross, which stood about half-way between Helston and Penryn, near the road-side, has been destroyed recently. A protective fence round old relics, as at Capel Garnon, in Carnarvonshire,

and at Bryn Celli, in Anglesey, is useful, and easy to construct. Sir J. Lubbock's Bill should include post-historic monuments; although, as it is, if passed, it may prevent cromlechs and pillars from being destroyed through ignorance, cupidity, and folly, or mischief.

CHR. COOKE.

A MUSEUM FOR CHESTER.

AN effort is now to be made to provide the "rare old city of Chester" with a museum capable of displaying her archæological treasures. The Marquis of Westminster lately presided at a meeting of the principal professional men and tradesmen of Chester, the object being to consider a scheme for uniting under one roof the city library and reading-room, the society of arts, the architectural and archæological society, the natural science society, and also for establishing a local museum, the nucleus of which is already secured to the city by a very fine geological collection presented by Lord Westminster. Plans were submitted of the house and a portion of the premises lately occupied by Mr. C. Potts, deceased, and a sum of 4,000*l.* was named for the same. The joint committees of the societies received power to treat for a rental of the premises, with the option of purchase.

GAS.

Air-Gas.—While noting particulars of the experiments lately made in London with an apparatus in which common air was charged with a hydro-carbonaceous spirit or mineral oil, and then stored in a gasometer for use, we suggested that the simplest and best way would be to fill the gasometer with mere air by lifting it, and then by weighting it forcing the air to pass through the hydro-carbon spirit on its way to the burners; because air so charged with spirit must tend to deposit the spirit in the gasometer before it is used. Now it turns out that the plan adopted at Sheffield by a Mr. W. Wright, and not very clearly announced in a local paper, is no other than this suggestion of ours put into practice. The *Sheffield Independent* thus describes it:—

"The new gas can be used either for lighting, heating, or soldering purposes, to each of which uses it was yesterday applied. The apparatus for heating consisted of a sheet-iron box, 4 ft. 6 in. long by 18 in. wide, with a small cistern, 6 in. deep, on two of the sides. At either end of the box was a 3-in. pipe. Air, supplied by a small fan, entered the box through one pipe, became carbonised; and left through the other—pure gas! It then passed into a perforated iron box, 6 ft. by 4 ft.; and in a few minutes after it was ignited, so great was the heat, the plate at the top became red hot. Unmistakable evidence was thus afforded of the heating power of the gas. In the yard, an airometer had been fixed to show the lighting power of the gas. *When the airometer was raised it filled with air; and on a weight being placed on it, the air pressed through three cylinders which contained the apparatus for carbonising it. The air, which had thus become gas, then passed to an Argand burner, was ignited, and gave a brilliant light.* The gas was also used for soldering purposes. A small pair of bellows, worked by the foot, pressed the air through a small cylinder, in which it was made into gas. Another pipe taken from the same bellows met the gas at the end of the blow-pipe, and thus a steady blast was created. The secret of the invention is in the spirit that is used, and in the mode in which it is applied in the cylinders. By means of the small apparatus Mr. Wright had at work, he was able to manufacture gas at the rate of 5,000 ft. per hour. He has not yet ascertained definitely whether what is either its lighting or its heating power, but both are believed to be considerably above those of the ordinary gas. He is of opinion that the outside cost will not be above 6d. per 1,000 ft."

Silber's Lights.—One of Silber's patent lights is about to be erected by the St. George's Vestry at Ebury Bridge. It is stated these lamps give a better light than gas, and are less expensive. If so, no time should be lost in adopting them all over London.

Price of Gas.—In the House of Commons, Sir C. Dilke asked the President of the Board of Trade whether, looking to the excitement which at present prevails in the metropolis on the subject of the price of gas, there was any objection to printing the accounts of the Metropolitan Gas Companies for the year 1872 at once, instead of at the end of the session of Parliament. In reply, Mr. C. Fortescue said,—"I am not able at once to have the accounts of the Metropolitan Gas Companies printed, because they have not yet been received; but I believe they will soon be presented, and that I shall be able to lay the return before Parliament at an earlier period than usual."

Instantaneous Gas-lighting Apparatus.—Professor Klinkerfone's apparatus for the instantaneous lighting and extinguishing of gas-lamps has been exhibited in the Gas-Meter Testing Office, Glasgow. The system consists in having each lamp furnished with a separate battery, and the apparatus used is a combined hydrostatic tap and galvanic battery. By increasing the gas-pressure from the street mains galvanic action is produced, the supply opened, and the jet ignited. By reducing the pressure the tap immediately closes, and the flame is extinguished.

SANITARY AUTHORITIES.

Gloucestershire.—A meeting of delegates from various sanitary authorities of the county, for the purpose of appointing a medical officer of health, has been held at the Gloucester Workhouse. The Rev. H. W. Maddy, chairman of the Gloucester Board of Guardians, presided, and about thirty delegates were present. The salary of the proposed officer had been fixed at 600*l.* per annum, with 200*l.* for travelling expenses. There were sixty-seven candidates, of whom eight were requested to attend the meeting. After the delegates had examined the testimonials, and had had interviews with each of the candidates, Dr. Francis Thomas Bond, of the Hartley Institution, Southampton, was elected, such election being subject to confirmation by the Local Government Board.

Public Health Act (1872).—In reply to Dr. Lush, in the House of Commons, Mr. Stansfeld said that the instructions given to the poor-law inspectors under this Act, and the urban and sanitary authorities, were not identical, as the conditions of each locality were different. In cases where medical officers of health were appointed over large areas, it would be necessary, sooner or later, for the authorities to avail themselves of the local knowledge of the poor-law medical officers for sanitary purposes, but he was not prepared to say what the remuneration for extra services, to which the latter were undoubtedly entitled, would be.

WOODEN HOUSES.

SIR,—If your correspondent, Mr. A. T. Holden, will turn to page xvi. (advertisement sheet) of the *Builder* of last week, he will find at least *four* firms who would send him an estimate for a wooden billiard-room on application. To my knowledge, one of these,—the seventh from the top,—recently supplied a two-roomed house, 25 ft. 6 in. by 13 ft. 3 in., by 7 ft. 9 in. at the eaves, within thirty miles of London, for about 75*l.* ALFRED STRONG.

METROPOLITAN IMPROVEMENTS.

SIR,—The want of a properly-constituted and recognised tribunal for metropolitan improvements is becoming daily more evident, and is one deserving of much consideration. My proposal is to establish a "permanent Board," to be styled the "Metropolis Improvement Board," and its members to be selected in manner following,—three members of the Government of the day, three of the Metropolitan Board, three of the Royal Institute of British Architects, three of the Institution of Civil Engineers, three of the Thames Conservancy Board. A comprehensive plan, embracing all the principal improvements, should then be drawn out, and such portions as bear immediately upon the necessities of improved communication should be set in hand, bearing in mind, however, that *direct taxation has already reached its limits*; and you, sir, will, I hope, agree with me, that if these improvements are to proceed *pari passu*, as they have of late progressed, other means must be provided for paying for them than out of the rates.

That this might be accomplished is a "consummation devoutly to be wished," and is, I believe, one worthy of the attentive consideration of Government, who should bear in mind that there is no more false economy than in starving "public works." PAULATIM.

CREWKERNE BURIAL BOARD COMPETITION.

SIR,—Will you kindly permit me space to inform architects and others intending to send in designs for the church and chapel, and other buildings, for the new Cemetery, Crewkerne, how I, in common, I suppose, with the other competitors for the premium for the best design for the laying out of the said cemetery, was served. Designs were advertised for; and in reply to my application for outline plan and particulars, a small tracing of a piece of land about 7 acres in extent was supplied, without particulars, except that 4 acres only were to be appropriated for the cemetery, and it was left open to competitors to select the portion each one deemed most suitable. I sent for further particulars, and declined to compete unless they were supplied, and after a week's delay my queries were answered. I then got up a design and estimate, and sent them in, and in a few days afterwards received a letter stating that *all the designs were rejected*, and that the Board had deemed it *indispensable* to a correct estimate that the person furnishing the same should have personally inspected the site. The same letter stated that the plan was returned together with another outline tracing showing the land the Board had definitely resolved to use, and contained a request that I would inform them whether I should compete again, as the Board would be willing to receive another design if I thought well to send one. The land I suggested was almost identical with that afterwards decided to be appropriated, but the outline of the south-west side on the second tracing was altogether different from the outline for the same side on the first tracing, and the cardinal points on the first differed by about thirty-seven degrees from those on the second tracing, consequently the time and money expended on the designs were wasted; and when written to upon the subject, the town-clerk acknowledged a slight difference, and replied that he was not in a position to say that the first plan was incorrect, neither did he suggest anything of the kind. Why, then, was not the second plan like the first? He further stated, that he went out of his way in supplying any tracing at all, and that the Board had not stated they would not accept an estimate from any person not having inspected the site, evidently forgetting that, in a former letter, he had used the word "indispensable," as above.

AN UNFAIRLY-TREATED COMPETITOR.

"SOME COMPLAINTS AGANIST CHELSEA."

SIR,—There is a paragraph in Mr. Lacy's letter, which appeared in your last issue under the above heading, which, if unexplained, might do me a serious injury. It says:—

"Mr. Elkington's tender was accepted conditionally that his sureties were correct. On the 21st ult. I received a letter from the clerk to the Board, which I enclose, stating that the contractor who was accepted not being prepared with sureties, would I be willing to abide by my tender and provide sureties?"

The facts as stated are substantially correct, though very wrong inferences may be drawn from the statement.

I was asked by the Board if I was prepared with sureties, and replied that I did not consider that for so paltry an amount as 2,550*l.* it was worth while to trouble any one to be security for me, but *offered to leave the first* 1,000*l.* *in their hands till the completion of the works.* Surely this should have been good enough.

As matters have turned out, I suppose that, had I offered the Bank of England as security, it would have been no use; but if the guardians meant Mr. Thorne to have *the job*, why not have given it to him without tender?

THOMAS ELKINGTON.

CASES UNDER THE BUILDING ACT.

AT the Clerkenwell Police Court, Mr. Robert Turnbull, of Sylvan Cottage, Hornsey-rise, appeared in answer to a summons taken out by the surveyor for the eastern division of Islington, for erecting a building situate on the north side of the yard at Mr. Trimmer's Brewery, Hornsey-rise, Islington, contrary to the rules of the Building Act.

Complainant stated that he summoned the defendant to this court about a fortnight ago for neglecting to give him, as the district surveyor, two days before the building in question was commenced, notice in writing, stating the particulars and intended use of such building, and for which offence defendant was fined 40*s.* The present summons was for constructing the same building, contrary to the Building Act. The building was erected upon brickwork, with timber framing, with an asphalte roof, and enclosed on three sides.

Mr. Wakeling, for the defendant, said the building in question was not a permanent erection, only a temporary shed to put the drays of the brewery under. It was on wheels, and could be moved about anywhere, and it was only required for about six months, while his client could erect a permanent building on another portion of the premises; that by section 56 of the Metropolitan Building Act, it was enacted, "When any builder is desirous of erecting any iron building, or any other building to which the rules of this Act are inapplicable, he shall make an application to the Metropolitan Board of Works, stating such desire, and setting out a plan of the proposed building, with such particulars as to the construction thereof as may be required by the said Board; and the latter, if satisfied with such plans and particulars, shall signify their approval, and thereupon such building may be constructed according to such plans and particulars." His client had made application to the Board under the above section for the erection to be allowed to remain for six months; he had also deposited tracings of the building, and paid 10*s.* for fees upon same, and his application would be laid before the Board at their next meeting; therefore, under these circumstances, he (Mr. Wakeling) asked that this summons should stand adjourned, to know the result of his client's application to the Board.

The magistrate adjourned the summons for fourteen days.

WORCESTER DIOCESAN ARCHITECTURAL SOCIETY.

THE annual meeting of this society has been held in the Council Room of the Natural History Society at Worcester. Mr. G. J. A. Walker presided, and there were also present—Sir E. A. H. Lechmere, bart.; the Revs. R. Cattley, W. Thorne, T. G. Curtler, W. W. Douglas, T. King, J. F. Green, E. Robinson, H. V. Vernon, G. C. Salt; Messrs. Walker Rennick, E. Lees, Hyla Holden, G. A. Bird, J. Cotton, and J. Severn Walker (hon. sec.)

The Hon. Secretary read the annual report, which was adopted.

Sir Edmund Lechmere, in moving the adoption of the report, said he thought it might be worth while to consider whether another object, in addition to the original object of the society, might not be recognised; that it should not merely be an architectural society, but also, as was the case at Oxford, an historical and antiquarian

society. He believed such an object would be productive of a great increase of members, without diminishing in any degree the practical utility of the society. Sir Edmund then expressed the hope, as one of the Cathedral Restoration Committee, that the Architectural Society would not come down upon them with a sweeping criticism as soon as the works now in progress are completed, but that even now, if they saw any points that would promote the interests of architecture or the beauty of that noble edifice, they would give the committee the benefit of their advice.

Mr. Severn Walker said that, with regard to the suggestion thrown out by Sir E. Lechmere, the society was practically, although not in name, archæological; but if they could make it more expansive, and enlist greater sympathy from the public generally by altering its title, and adding to it an historical section, it might be advantageous to do so.

The president, vice-presidents, honorary secretaries, treasurer, and auditors were re-elected, and the committee for the ensuing year formed.

RE-OPENING OF THE PRIORY CHURCH, DUNSTABLE.

AFTER a partial restoration at a cost of about 6,700*l.*, this church, according to the *Bedford Times*, has been formally reopened for divine worship.

Three years ago, the sum of 5,000*l.* was expended, and now 1,700*l.* more have been devoted to the work of restoration. The north aisle, however, remains to be restored, and towards this the Duke of Bedford has promised to supplement his former donation by a second sum of 500*l.* 300*l.* more are also promised from other sources. The exterior also needs restoration. As for the interior, the work of restoration became a matter of necessity, for it was not until the roof threatened to fall in,—tie-beams were rotten, rafters were dropping, and an ornamental corbel had fallen,—that a decided step was taken towards the restoration of the edifice.

At the entrance an oak screen has been erected. The clergy of the rural deanery have presented the church with a pulpit of marble, the sides being of variegated brown, from Torquay, and the upper portion of polished Derbyshire marble, with a carved eagle supporting the book-rest upon its wings. The steps are of brown Mansfield stone, and the lower portions of Kettering stone. The floor is laid with Minton's encaustic tiles. Haden's patent hot-air heating-apparatus is provided. A new reading-desk of carved oak has been purchased. The old style of pew is done away with, and open pews supplied instead. The chancel, as far as it goes, is all new, but a good deal is required to finish this part of the edifice. A new font has been provided, and a new vestry erected. The old gallery is cleared out, and the organ-loft has disappeared.

Mr. S. Clarke was the architect under whom the restorations have been carried out. We gave a view of the church some time ago.

GIFT BY THE CROWN TO THE TOWN OF DUMFRIES.

THE estate of Hannahfield, which, in default of heirs, fell to the Crown, has been gifted to the magistrates of Dumfries, and the sheriff and sheriff's substitute of Dumfries and Galloway, in trust.

Part of it is to be converted into a public park, and the revenue derivable from the remainder to be applied to the improvement of education in Dumfries and Galloway.

The greater part of this estate originally belonged to the burgh of Dumfries, and was called the Kingholm; but, about fifty years ago, it was sold in order to extinguish debts incurred by the burgh. The purchaser was a Mr. John Hannah, a native of the burgh, who had accumulated a considerable fortune in Jamaica. This gentleman added to the landed estate, and being unmarried, intended to leave the property for the support and maintenance of an educational institution,—the Burgh,—and had actually prepared a will for that purpose, but he died before the deed was completed. His only relative was a nephew, who succeeded by law to the estate; he again left it to his widow, and she having died, in 1868, intestate and without issue, it fell to the Crown, as *ultimus hæres*.

In granting this gift, the Crown has reserved to itself the right of drilling troops upon the park. Dumfries was a military station, and the War Office was frequently put to considerable expense in brigading the contingent quartered there, there being no sufficient space of ground in the neighbourhood at command.

It is expected that the personalty will be sufficient to defray all preliminary claims, so that the land will be free of burden.

The good news was received by the Dumfriesians with demonstrations of joy, ringing of bells, banquets, &c.

In this instance the Crown is only following the example set by several wealthy private individuals, and is besides practically carrying into effect the intentions of the person by whose exertions the estate was acquired.

DIGGING FOUNDATIONS TO THE INJURY OF ADJOINING HOUSES.

Burdon v. *Gradon*.—This action, brought in the Durham County Court, is one of some interest to architects and builders, in regard to foundations, and also to owners of house property.

The plaintiff claimed 50*l.* damages of the defendant, who is a builder, under the following circumstances.

Mr. Burdon stated that in 1842 he built a house, and superintended the laying of the foundation. The ground was peaty, but the floors were laid with 2 ft. of concrete. The house on the north side, and a timber-yard, belonged to Mr. Gradon, the defendant, and considerable alterations have since been made in Mr. Gradon's property, and an engine erected close to the witness's house. The defendant has cut away one house, and removed three walls that formerly supported witnesses house, and the garden party-wall fell down in consequence of the excavations made by the county architect, who is architect to the alterations. The floor of the back kitchen sank 5 in. on Mr. Gradon's side, and the fireplace was injured. In the front kitchen the floor was sprung up, and the fireplace let down. The outer walls were cracked in several places; back window-frames considerably out of level. The ridge of the house on Mr. Gradon's side sank 5 in., and parted from the adjoining property, and the front windows are dropping in, and the damage was done within three months of the commencement of the excavations, and he estimated the damage at upwards of 50*l.* Upon speaking to the defendant, he said he would send a man down to make it good, but all he did was a little work to the spouting. He could not now let the house, and had to live in it himself. He further experienced a great nuisance from the vibration of the defendant's steam-engine which did his building work. The engine was worked with metal cog-wheels, and caused a great noise.

In cross-examination by Mr. Edge, counsel for the defendant, the plaintiff said: The tenant who occupied the house twenty years ago did not remove because witness would not repair it. Another tenant had complained of the roof, but there was only one slate off. Did not speak to Mr. Gradon about the damage until 1871, as he wished to ascertain its full extent, and he had spent 10*l.* in repairing it since he went to live in it. Will not swear that the defendant did not offer to put the floors right, rather than be unneighbourly.

Mr. Robson, a builder, proved the damage, and cost of reinstatement.

In answer to the case, Mr. Edge said, the action had been brought in order to make his client build the plaintiff a new house. No excavations had been made as stated by the plaintiff. His client had offered as a neighbour to repair the floors, but the plaintiff would not let him, and now sought to recover vindictive damages. In fact, Mr. Gradon had done nothing he was not entitled to do in carrying on his business, and the present condition of the plaintiff's property was owing to his neglect in repairing the house. With regard to the claim for compensation, on account of the alleged nuisance of the defendants' engine, every care had been taken in working the machinery, and no unnecessary noise had been caused.

Mr. Crozier said he was the county architect, and prepared the plans for the alterations of Mr. Gradon's premises. The work was done according to these plans, and no excavation had been made in carrying out the alterations either under Mr. Gradon's house, or within 6 ft. or 7 ft. of the walls of the plaintiff's house. The front kitchen of the house pulled down had been filled up to the extent of 6 ft. or 7 ft., and an archway made through the house itself, so that conveyances could be taken into the defendant's premises. The present floor of the back kitchen also stands on the old floor, and is 2 ft. higher than the old floor: 2 ft. of concrete was laid on this floor in order to make a good bed for Mr. Gradon's machinery. There were no cracks in the defendant's house in consequence of the vibration of the engine. He did not consider that anything Mr. Gradon had done to his premises had in the least injured the plaintiff's house. The only place where any excavation was made was in the garden behind the defendant's house, but that work was only carried to within 7 ft. of the plaintiff's property. Before Mr. Gradon commenced his alterations, witness had noticed the dilapidated state of the plaintiff's house.

The judge, Mr. Meynell, said if machinery adjoining a dwelling-house made such a noice as to cause inconvenience or injury, or a nuisance to any one, an action would lie; but if it were only a slight noise it would not be actionable. If a person had a piano in his house, and his neighbour, owing to the thinness of the walls, was annoyed by the instrument, that would not be sufficient ground for an action. In this case all the evidence was given by Mr. Burdon, who stated that he experienced inconvenience when the engine was started in the morning. He alleged that the engine shook his bed, and prevented him from sleeping, and if that were so why there was a nuisance. With regard to damages, it was usual in cases like this only to give a small amount in the first instance, because other actions could be brought afterwards if the nuisance were not abated. Still if the jury considered it right, they could give substantial damages for the alleged nuisance.

The jury, without leaving their box, gave a verdict for the defendant in both cases, and the Court allowed Mr. Gradon full costs of counsel, attorney, architect, and several witnesses, who were not examined.

THE ANNUAL REPORT OF THE METROPOLITAN BOARD OF WORKS.

THE report of the Metropolitan Board of Works for 1872, which has just been issued, contains some interesting particulars as to the work which has been effected by the Board during the past year, together with other works contracted for and immediately to be commenced.

Amongst other items contained in the report it is stated that during the year sixty-five plots of the surplus land in Queen Victoria-street have been let at a rental of 26,592*l.*, and some have been sold, including 15,531 square feet to the Metropolitan District Railway Company for 73,373*l.* The report adds that all the remaining ground will very probably be let or sold during the present year. The works at the Chelsea Embankment were rapidly proceeding. On the question of parks, the report states that the Board have resolved not to let for building purposes any portion of the land purchased for Finsbury Park, and that a greenhouse is to be erected there in which to propagate plants for the gardens of the Thames Embankment. Southwark Park has been similarly dealt with, and all the ground purchased, with the exception of a small outlying portion, is to be included in the park. The Board have also purchased of the Crown 23¾ acres for 20,450*l.*, for the purpose of adding it to Victoria Park, for the recreation and enjoyment of the public.

A review of the drainage and sewerage works effected by the Board during the year forms a prominent feature in the report. With the exception of 8,000 feet between the Chelsea Suspension Bridge and the pumping station at Cremorne, the main drainage works were complete, and the delay in completing this portion was occasioned by the Chelsea embankment. For the intended new western pumping station near the Grosvenor Canal, Pimlico, contracts have been signed to the amount of 126,950*l.* for buildings, and 56,789*l.* for machinery, making a total of 183,739*l.*; and in the course of two years the works will be complete. The report adds, that when that is done, the sewage from the westernmost portion of the sewer will no longer be pumped into the river, but raised into the eastern portion, and conveyed into the Abbey Mills pumping station. Contracts have been entered into for sewer connexions in the city; and five contracts have also been entered into for sewer works at Hammersmith Creek, Stamford Brook, Hackney Wick, the Fleet sewer, and High-street, Shoreditch. In addition to the sewer and drainage works executed during the year by the Board itself, the Board has also given its sanction to plans for twenty-four miles of sewers executed by the several District Boards, these sewers varying from a 9-in. pipe to a brick sewer, 4 ft. 3 in. in dimension; whilst during the year 356 branch sewers have been connected with the main sewers.

At the conclusion of the report it is stated that the net debt of the Board at the close of the year was 6,389,530*l.*, and that it had lent to various District Boards during the year, sums amounting in the aggregate to 215,273*l.* for public works; also a further sum of 62,400*l.* to certain of the Boards for paving and other purposes; and had contributed 73,600*l.* towards public works, costing 149,052*l.*

FROM SCOTLAND.

Edinburgh.—In reply to the memorial forwarded to the Secretary of War, calling attention to the baldness of design and generally unsatisfactory character of the buildings now in course of erection on the south slope of Castle-hill, as quarters for married soldiers, a communication has been received to the effect that the matter shall receive due consideration in the proper quarter. Meanwhile, the *Weekly Scotsman* states that the city superintendent of works, Mr. R. Morham, jun., has prepared a plan by which, without any material alteration of what has already been done, the internal character as well as the external appearance of the buildings would be greatly improved. The introduction of pantries and of sanitary appliances on a more satisfactory scale than was contemplated in the original design affords the

opportunity of adding certain features in the elevation and sky-line of the block. This plan is, we believe, to be forwarded to the War Office, as affording a feasible suggestion for the improvement of the buildings.

CHURCH-BUILDING NEWS.

Blaydon.—A new cemetery has been set apart at Blaydon, and the consecrated portion dedicated by the Bishop of Durham, in the presence of a large company. The ground set apart for the cemetery was purchased two years ago from Colonel Towneley, and two chapels and mortuaries have since been erected, together with a superintendent's house and offices. The buildings and laying out of the cemetery have been carried out by Messrs. March & Smith, under the superintendence of Mr. Matthew Thompson, architect, Newcastle. The churchyard being nearly filled up, the cemetery supplies a desideratum in the parish.

Alton.—The steeple of the parish church has been for some time under repair, the work being placed in the hands of Messrs. Puzey & Filewood, of this town, builders. The steeple has been entirely stripped of its former covering of lead, weighing many tons, and will be replaced by oak shingles.

Chard.—A Mission Church, in connexion with the Free Church movement, has been built here. It occupies an elevated site in a meadow adjoining the station-road, and has been erected principally at the cost of the Rev. C. S. Grueber, B.A., of Hambridge, near Langport. The church, as it stands at present, is a very modest and unpretending structure, and will be so for some time to come. The east and west walls are the only portions of the fabric which it is intended to leave in the same state as they are now. These are built of local stone, with Ham-hill dressings. There is an oriel window at the west end, but the east wall is only lighted by small side windows; the intention being to leave space for a large altar-piece. The building is 105 ft. long by 27 ft. wide. There are an organ-chamber, a small vestry, and a robing-room. The side walls are built of flint and brick, and are to be removed, if more room should be required, as soon as the funds can be obtained for building transepts. The timbers of the roof are stained and ceiled between. The chancel is elevated (in two stages) 6 ft. above the floor of the nave, and the altar is to have gilt crosses, candelabra of various sizes, drapery, &c. The seating consists of very plain chairs. The building is lighted with eleven large windows and gas. Some arrangements have been made for heating the church, but at present the heating-chamber (beneath the altar) is without an apparatus. The contractor was Mr. M. Davis, builder, Langport, and the cost is estimated at 1,500*l*. The formal opening of the church has not been fixed.

Horsham St. Faith's (Norfolk).—The restoration of this well-known church has long been desired by those who were acquainted with its history, its condition, and the wants of the parish. Distant four miles from Norwich, on the Aylsham-road, its tower arrests the attention of the traveller, whilst its connexion with the once famous Abbey of St. Faith's, commends it to the antiquary. An effort is being made to accomplish the restoration of the church. It is proposed to underpin and otherwise strengthen the outer walls, and thoroughly restore the windows, tower, belfry, porch, roofs, pulpit, screen, and re-seat the whole of the interior. If a sufficient sum of money can be raised, the brick arches of the nave (now leaning outwards), the chancel arch, and clearstory will be rebuilt in stone. The cost of these works will be about 2,100*l*. or 2,700*l*. if the arcading is rebuilt. The plans and specifications have been prepared by Mr. R. M. Phipson, and approved by the vestry, and by the bishop, and tenders have been sent in. It is proposed to commence at once, if an appeal issued meets with a ready response. A lady, connected with the parish, has offered 1,000*l*., and it is hoped that this donation will be followed by other gifts from owners of property in the county.

Thirsk.—A vestry meeting has been held in the crypt of Thirsk Church to receive the report of a committee appointed last Easter for the restoration of the church. The scheme adopted by the committee was based upon a report and plans prepared by Mr. G. E. Street, architect. The committee proposed that the following should be the order in which the different parts of the work of restoration be undertaken, according to the funds at their disposal:—1. The roof, exclusive of pinnacles and other external adornments. 2. The scraping of walls and pillars. 3. Re-flooring and re-seating. 4. Re-warming and re-lighting. 5. Vestry, ground porch, pinnacles, &c. The scheme of the committee was approved and adopted unanimously by the vestry. It may be added that Mr. Street's estimate for the whole work is 4,600*l*.

Bridgnorth.—The new tower of St. Leonard's has been completed and opened. It has been already described in our columns. The stone employed in its structure was brought from the Town's Mills Quarry. The dressings are in red Alveley stone, and the panelling in the belfry windows is of white stone from the same district. The height is the same as that of the old tower, viz., 89 ft. to the top of the cornice, 95 ft. to the top of the battlements, 106 ft. to the top of the pinnacles, and 125 ft. to the top of the summit of the spire. The embattled cornice at the top is surmounted by eight other pinnacles crocketed. On the north-west angle of the tower is a turret, terminated by a starting from eight other pinnacles, and further enriched with crockets running up each of its sides. The large window in the tower is filled with stained glass by Messrs. Clayton & Bell. The subject is the types of Baptism, the Saviour being the central figure. On either side are figures of Moses, Noah, John the Baptist, and Nicodemus. Messrs. Slater & Carpenter, of London, were the architects; Mr. Escourt, of Gloucester, the contractor; and Mr. Harry Hems, of Exeter, was the sculptor employed.

Monmouth.—St. Thomas's Church is being restored. The vicar discovered that the roof of the chancel was in a bad state, and that the foundations appeared to be giving way in places. He communicated with the Duke of Beaufort, to whom the church belongs, and the result was that Mr. Pritchard, architect of the diocese of Llandaff, received instructions to restore it at the entire cost of the Duke. It was further discovered that the stonework in the north and south windows had perished. The east window, of three lights, was found to be an innovation, the lights being merely placed in the wall with cement. The work of restoration is now rapidly progressing; the whole of the foundation has been renewed with native stone from Longstone Wood; the walls have been underpinned, and the old heating apparatus taken up. The latter was found to be so useless as to necessitate laying down another. On the coping from the north door being removed, it was found to be a casing placed over the original coping. This door has never been touched since its first erection, and it was found that its entire restoration was needful. The tracings are so far discernible. In stripping the old walls, which had at some time or other been stuccoed over, a window was discovered between the north door and the wall of the nave which divided the chancel, which will be restored to its proper use. In stripping the plaster from the south wall it was discovered that a Norman window had been taken out in its entirety, and the place filled in with stones and bricks. In all cases where a window has been built up there will be replacements, of the same design, and everything possible will be done to render the restoration of this interesting church a perfect one. The outside of the walls will be painted, not covered with plaster, as before; there will be a new open roof of pitch pine, with a boarded ceiling, and the covering will be of sea-green slates from Penmole. There will be new altar rails and steps, and encaustic tiles will take the place of the present wooden flooring.

Ilkley.—For some time past the parish church at Ilkley was much too small for the increasing number who attend it. Application was made to the lord of the manor for a site for a new church, and he consented to grant a site in what was originally known as "The Riddings," a short distance below Wells House, on condition that 1,000*l*. were raised towards the object. This sum has been obtained, and it is believed that the transfer will immediately be made and building operations commenced forthwith.

Moving a Lighthouse.—The Ness Point Lighthouse, near Lowestoft, is being moved inland about 100 yards. The bottom iron framing has been unscrewed from the lower piles, and the building lifted by means of screw-jacks. Iron flanged wheels have been screwed to the bottom frame, a temporary railway has been laid down, and the building has by these means been moved some 40 ft.

Books Received.

Illustrated Guide to the Fish, Amphibian, Reptilian, and supposed Mammalian Remains of the Northumberland Carboniferous Strata. By THOMAS PALLISTER BARKAS, F.G.S. London: Hutchings, Bouverie-street, Fleet-street. 1873.

Atlas of Carboniferous Fossils from the Northumberland Carboniferous Strata. By T. P. BARKAS, F.G.S. London: Hutchings.

THE author of these works has long been engaged in the investigation of the palæontology of the coal measures, with the indispensable aid of practical and intelligent coal-miners in Northumberland, and the interesting results are the Manual and Atlas under notice.

Amongst the discoveries made by Mr. Barkas is one which has for some years excited a good deal of heated controversy among palæontologists and geologists. This was a mandible, illustrated in the Atlas and described in the Manual, as probably that of an insectivorous mammal. Now it has not hitherto been considered to be orthodox to admit or suppose the existence of any mammal during the carboniferous era, the foregone conclusion, or hypothesis, amongst the orthodox being that the time for the existence of mammalia had not then come. This hypothesis has been based upon the fact that heretofore such remains have not been found,—a curious reason for objecting to the finding of them now, but simply an indication that it is disagreeable to have a fine theory overturned by facts. Mr. Barkas calls the mandible in question a supposed mammalian relic, but he seems to have no doubt of it, and probably it is so; but is it to be wondered at that remains of land animals should be few and far between in ocean deposits where fishes are so abundant? A new light on the antiquity of the mammalia, and even of man, appears to be struggling through the darkness and the errors of past geological and palæontological speculation; and we may ultimately find that, while little else but fishes were being deposited in certain regions of the sea, mammalia, and even mankind, existed in abundant numbers elsewhere on the face of the earth. Even already recent facts seem to show that man did exist *before* the glacial era, during the drift of which era such complete evidence of his existence had shortly before been found; and Mr. Barkas is one of those pioneers of the new light whose fact-respecting animus ought to be favourably regarded, even were he proved to have been mistaken in the present instance, which, so far as we know, he has not yet been.

Street's Indian and Colonial Mercantile Directory for 1873. G. Street, 30, Cornhill.

CONSIDERABLE improvements have been made in this Directory. The various steam routes to the places treated of, with rates of fares and times of transit, are given. All the London agents to each of the banks are named, so that the merchant is enabled to see to whom to apply; also particulars as to the principal products and the articles in which the trade of each place chiefly consists. Information, too, regarding the principal Government offices in each town, and of the various railways in operation or construction, is added. It is quite evident that Messrs. Street have bestowed a large amount of time and labour, both locally and at home, on the production of the work, which we can, in consequence, recommend.

VARIORUM.

"THE Complete Peerage, Baronetage, Knightage, and House of Commons for 1873. By Edward Walford, M.A. (Hardwicke)" is one of the handiest little books that can be found for the library table.——The *House Furnisher* remarks,—"The artist-decorator has need to pay some attention to methods of artificial lighting. By present system and practice, light is inadequate; the gaseliers are usually not much removed from ugliness, and in public rooms are placed so as to interfere with designed effect of ceilings; ventilation, when provided for in conjunction with the lighting, entails a new element of deformity, and now gas tends to becoming a costly product. The ample light being necessary for its own contributing to a general effect, and for illuminating the decorations, if such there be, of an apartment, as much as for writing or reading by, it is even more important than would readily appear that there should be reduction rather than increase of price, or that substitutes should be found. There is a company

established for the working of Rusk's Patents, by which there is contemplated a saving of 50 per cent. in the labour of making. A similar saving has been promised by Mr. Silber, who recently read a paper at the Society of Arts, describing his method. For the different forms of ventilating lights, little indeed has been done since the particular effective application of the sun-burner was made by Mr. Gibson, architect, in his National Provincial Bank of England in Bishopsgate-street.——The writer of "Cassell's Races of Mankind" (April), speaking of the Indians, says,—"In arts they are also far from unskilful. Their beautiful canoes, carved out of a single cedar-tree, nets, and various descriptions of arms, fully illustrate this, though the southern tribes (the Diggers) have only the rudest description of these. The northern tribes excel in this capacity for art, and many of their pipes and other carvings, made of a soft shale or slate found in their country, are now common objects in European museums. These are all made by the Queen Charlotte Islanders, the Tsimpheans, and the tribes of Russian America (Alaska). I knew a Hydah who could take a very fair portrait on ivory, scratching it out with a broken knife; and the railings of the balcony of the Bank of British Columbia, in Victoria, were designed by the same man. I have seen a pair of gold bracelets made out of twenty-dollar pieces by him; and rings, earrings, and other pieces of jewelry made by the same people, in a style that would not disgrace a civilised artist, are very common along the north-west coast. Mr. Dallas, formerly Governor of the Hudson's Bay Company, has an excellent bust of himself, carved by an Indian out of a walrus's tusk, the only tools used being a file, an old knife, and a piece of shark's skin in lieu of sand-paper. On this being shown to an eminent sculptor in London, he assured him that it could not have been executed better by himself. The same gentleman has a pair of the ear-bones of a whale carved by an Indian in a similarly excellent manner. The man-bull of Nineveh is often copied by them in slate from the pictures in the *Illustrated London News*, got from traders and others; and, unless this was known, the presence of such designs among them would rather puzzle an ethnologist."——The *Popular Recreator*, just now commenced by Messrs. Cassell & Co., is to be a complete guide to every description of out-door and in-door amusement, "including on the one hand all ordinary athletic exercises and games of skill and chance, and upon the other those practical, natural, and scientific pursuits which will be found to fill up leisure time agreeably as well as profitably, and to have an improving and elevating effect on the mind, health, and character." No. 1 is a good beginning. —— The *Workman's Magazine* for April, which is apparently not so well supported by the workmen's clubs as its promoters expected it would be, urges the establishment of "Trades' Guilds of Learning," to promote education amongst skilled workmen. Complaint is made that the teachers at South Kensington are not practical. It can scarcely be expected that a practical workman in every trade should be found there as a teacher. If knowledge of drawing and the elements of science can be obtained there, the special application must be worked at elsewhere.

Miscellanea.

The Ancient Monuments Bill.—Petitions in favour of the Ancient Monuments Bill, by Sir J. Lubbock, have been presented to the House of Commons, from the Society of Antiquaries of Scotland, the Archæological Society of Wiltshire, a committee of Exeter Diocesan Architectural Society, hon. secs. of London and Middlesex Archæological Society, St. Alban's Architectural and Archæological Society, general president of Architectural and Archæological Societies of diocese of Lincoln, Yorkshire, archdeaconry of Norththampton, Bedfordshire, diocese of Worcester, Leicestershire, Sheffield, and secretary for Lincolnshire to Society of Antiquaries of London; fellows and members of Royal Historical and Archæological Association of Ireland; hon. sec. of Architectural and Archæological Society of Buckinghamshire; president, vice-president, and officers of Somersetshire Archæological and Natural History Society; president and hon. sec. of Liverpool Architectural and Archæological Society; and president, and hon. sec. of the Historic Society of Lancashire and Cheshire.

California Marble. — It is a fact, not generally known, that the coloured marble of California is superior in point of beauty to any European production of like nature, and is preferred by the Italians to the marbles of their own country, where it is sold by the pound, and is used in veneering. This marble is found in detached boulders, below the surface of the earth, near Suisun, Solano county, and may be quarried at a small expense. In 1858, large quantities of the marble were taken out and sent to Europe by capitalists of this city, and subsequently, on account of inefficient management, or for some unknown reason, the business failed to pay, and was suspended. Mr. Heverin, of the Pioneer Steam Marble Works, during a visit to Italy, two years ago, noticed that the Italians placed a high value upon California marble, and he finally became so much impressed with the importance of the product that he determined to utilise it in his manufactory. Several articles made of the marble have found a ready sale, and despite its inconvenient locality, the stone is becoming popular here. In the office on Jackson-street, between Montgomery and Sandsome, is a polished block of this marble, which Mr. Heverin has quarried, and intends forwarding to the Vienna Exposition, at his own expense. The block is 1 ft. square, and 18 in. long, and weighs two hundred and seventy-five pounds. The marble is of a beautiful tortoise-shell colour, with occasional veins that remind one of petrified wood, and is susceptible of a fine polish. This marble will do credit to the State. A mantel of California marble, a rare piece of workmanship, has recently been completed by Mr. Heverin.—*San Francisco Bulletin.*

Opening of a new Brewery at Lichfield.—The new brewery premises of the Lichfield Brewery Company, lately erected just out of St. John-street, in the city, have been opened with a dinner, to which the whole of the *employés* were invited. The works were begun last year. The brewery just completed is a model one. Mr. George Scamell, of Westminster, was the architect and engineer, and the whole work has been carried out under his superintendence. The new buildings cover an area of about 128 ft. long by 88 ft. wide. The malt-rolls, mash-tuns, engine, &c., are situated at the west end, and in an adjoining building are three wort-coppers and two steam-boilers. The upper floor is divided, part being used for malt and hop stores, and the remaining portion for the fermenting-tuns, the cooler and refrigerator being over the tuns. The first floor is the union-room, 95 ft. long by 85 ft. wide. The ground-floor will be used for "racking" or filling the trade-casks. In the basement extensive cellarage has been provided. A well has been sunk on the north side, and an abundance of water, of a good brewing quality, has been obtained. The total cost of the whole of the buildings and plant will be about 11,000*l*. The contract for the buildings was taken by Mr. Dakin, Lichfield; the ironwork by Mr. Crosskey, Lichfield; the millwright's work by Messrs. Buxton & Thornley; the brickmaker's work and the pipe-connexions by Mr. Oxley; and the three wort-coppers by Messrs. Allen & Harrison.

The Sewage Question at Barnsley.—A "Report of the Sanitary Committee on Collection and Disposal of Excrementitious Matter," has been presented to the Barnsley Council, and printed for circulation, by Mr. Moxon, of Barnsley. We are sorry the committee can say nothing better than this:—

"As the water-closet system is, in their opinion, inadmissible, being subject to the grave faults of unhealthiness, by polluting the air of the sewers, and consequently of the streets and houses communicating therewith; wastefulness, by the destruction of so much fertilising material a nd costliness, both on account of the apparatus required, and the increased expense in purifying the streams into which the sewage eventually flows, they recommend the simple 'pail or tub' system, with the 'ash-screener,' and frequent removal, to be adopted within this borough, as the most thorough-going and economical of the many methods now before the public,—a pecuniary advantage being 'that it produces an excellent manure, which can be made to pay more than the cost of collecting it.' It is also a vast improvement on the ashpit system."

Chapel of St. Paul's College, Stony Stratford.—Mr. G. Goldie wishes us to mention that the cost of this building, illustrated in our pages during the course of last year, including all its fittings, as stalls, screens, gas, &c., was 3,600*l*., and not 5,000*l*., as stated by Mr. Picton in his lecture at Liverpool, reported in our last issue.

Public Improvements in Salford.—The Salford Town Council have just agreed to expend upwards of 6,000*l*., for the purpose of extending the head-quarters of the police force, and for providing better accommodation in the borough Police-court. The tender of Mr. W. Southern, of Manchester, has been accepted. The portion of the town-hall buildings now occupied by the weights and measures department, the waterworks department, and the fire-brigade, will be taken down, and a two-story building, corresponding in style with the rest of the building, will be erected. If the plans as they now appear are adhered to, the internal arrangements of the new court will be superior to those of the stipendiary magistrate's court, where the ventilation is exceedingly faulty, and the new parade-room will be 20 ft. longer than the present one. The dimensions of the court-room will be 65 ft. by 28 ft., and of the parade-room, 58 ft. by 28 ft. 6 in. The interior of the parade-room will be of coloured bricks, with stone dressings to the windows, and will have an open-timbered roof. To carry away the foul air from the cells and from other parts of the building a shaft, which will rise to the height of 20 ft. above the roof, will be erected. The proposed extension of the police department has rendered necessary the removal of the central fire station. Extensive and commodious premises have been erected in Ford-street, Chapel-street, about thirty yards in the rear of the Town-hall buildings. The new fire station, which will be completed in a few weeks, will have cost about 2,000*l*.

Royal Horticultural Society.—At the adjourned general meeting of Fellows, all the members of the council save one, at present abroad, tendered their resignations. Thereupon, Lord Strathmore moved that all these resignations, with the exception of those of H.R.H. Prince Arthur, H.S.H. the Duke of Teck, the Duke of Buccleuch, and Lord Londesborough, be accepted by the meeting. The motion was carried by a large majority. Lord Strathmore then nominated the following to succeed the other members of the old council:—Viscount Bury, M.P., the Hon. R. Chetwynd, Mr. Hardcastle, M.P., Sir Coutts Lindsay, Mr. W. A. Lindsay, Sir A. Slade, Dr. Kellock, Mr. A. Smee, Mr. H. Little, and Mr. A. Murray. The proposition was seconded by Sir C. Daubeny, and after a very excited discussion was carried, upon a vote by ballot, by a majority of 62; the voting being 85 for, and 23 against. Sir Coutts Lindsay moved, and Viscount Bury, M.P., seconded, the re-election of the Duke of Buccleuch as President of the Society. Mr. W. A. Lindsay was elected secretary of the society, in the room of Major-General Scott.

Opening of a New Pier at Eastham, Cheshire.—It has long been considered a drawback to the attractions of Eastham that the facilities of landing have been totally inadequate to the requirements of the place. The old slip is in a dangerous condition, and from its position materially assisting the silting up of the channel, by causing an impediment to the natural current of the river, it was determined by the owner of the property, Mr. R. C. Naylor, of Hooton Hall, to reconstruct the entire work, and by the removal of the pile staging at the bottom of the masonry slip, endeavour to obtain the same depth of water which existed prior to its erection. The new pier has been formally opened. From the platform on the shore an iron pile pier is carried out upon 12-in. raking cast-iron piles and wrought-iron girders. The bridge is 100 ft. long, and 8 ft. 6 in. in breadth, and was designed by Mr. Brunlees, of London. The pontoon, or landing-stage below the bridge, is 140 ft. in length and 26 ft. in width. The masonry work has been executed by Mr. D. Readdie, of Liverpool; and the ironwork has been erected under the personal superintendence of Mr. Thompson, the lessee of the ferry.

Cottage Hospital at Moreton-in-Marsh.—The erection of this Institution has been completed. It is a work in which Lord Redesdale and the nobility, gentry, and inhabitants of the town and neighbourhood generally have taken an interest. The structure will be furnished with every requisite for the comfort and convenience of invalid patients. Mr. George Davis, the contractor, gave the workmen a substantial dinner at the Unicorn Hotel on the occasion. Mr. W. Callaway, the architect of the building, presided, and was supported by Mr. G. Davis and Mr. C. Hortin. Mr. C. Lane occupied the vice-chair

Prevalence of Fever in Ovenden, Halifax. The scattered village- and hamlet-covered district of Ovenden, which for some time past has been the scene of an alarming prevalence of fever, spreading partly also into the borough of Halifax, and in all seriously increasing the death-rate, has led to an investigation by Dr. R. Thorne Thorne, one of the medical inspectors of the Local Government Board, who has been sent down for the purpose. Having completed his inspection, Dr. Thorne communicated the result of it to a meeting of the members of the Ovenden Local Board, held in Halifax, at which members of other local boards were present by invitation. The chair was occupied by Mr. Thomas Robertshaw, chairman of the Ovenden Local Board. Dr. Thorne dwelt especially on the state of the middens, as they are and as they ought to be, and the want of drainage, admitting all the difficulties peculiar to such a district; and also on the class of diseases to which the state of the district contributed, and their prevention and cure. Thanks were unanimously accorded to Dr. Thorne for his able and practical discourse.

Lambeth Palace.—The Society for the Encouragement of the Fine Arts transferred its meeting-place last week from Conduit-street to the Library of Lambeth Palace, says the *South London Chronicle*, and held it in the forenoon instead of the evening. There was a large muster of members, including many ladies. Mr. S. W. Kershaw, M.A., the librarian, condensed a lecture from his erudite work on the "Art Treasures of Lambeth Library," and rare volumes were displayed upon the table in illustration. At the close, thanks were voted to the archbishop for allowing the visit to be paid, and to Mr. Kershaw for his paper. The company, under Mr. Kershaw's superintendence, inspected the chapel and the Lollard's Tower, as well as the collection of portraits of past incumbents of the archiepiscopal see; and some of the party were conducted by Archbishop Tait in person over several of the more noteworthy of the private rooms of the palace. At the next ordinary meeting of the society, Madame Ronniger will deliver a critical and illustrative lecture on Shakspeare's "Macbeth."

Overcharge on Income-Tax in London. We have received a communication from a barrister on the excess of income-tax to which the London householder is subjected by the Metropolis Valuation Act, 1869. He wishes to call the attention of landlords and tenants of houses and buildings within the metropolitan district to the operation of this Act, by which the actual income derived from such property is charged with income-tax, to an extent of from 16 to 25 per cent. more than the same amount derived from other kinds of property, expenditure being treated as receipt. The additional amount he points out is nearly four millions and a half:—

"The last valuation-list of the several parishes in the metropolis gives for gross annual value, 24,783,600*l.*, and for rateable value 20,360,535*l.* The difference, 4,423,065*l.*, represents the annual amount expended in repairs, &c., required to make the property produce an income; but the income-tax is levied on the whole 24,783,600*l.*, so that the net income of 20,360,535*l.* derived from house-property in London pays the income-tax on nearly *four millions and a half* beyond that paid by the same income derived from land, mortgages, the funds, and other kinds of property."

Gas Statistics.—According to the engineer of the London Gas Consumers' Association, the amount paid for gas in London in 1872 was 2,354,487*l.* 14s. 6d.; the quantity sold, 12,165 millions of cubic feet; the coal used, 1,615,774 tons; the cost of gas to the street lamps, 251,147*l.* 6s. 9d.; the kind of coal used for gas-making has cost, from 1862 to 1872, prices ranging from 5s. 3d. to 6s. 9d. per ton,—this, with the coal duty of 1s. 1d., and the freight and other charges for lighterage added, shows the average cost of gas coal last year, free in the works of the several London gas companies, 14s. 7d. per ton only; the gas obtained is 9,200 ft. to the ton; the products are 36 bushels of coke, 10 gallons of tar, and 10 gallons of ammoniacal liquor, worth generally about 10s., but now, through the advanced price of house coal, more than the gas coal costs.

Public Baths for Hackney.—At a very full meeting of the Hackney Vestry, held last week, the question of the erection of public baths and washhouses for Hackney was the subject of a prolonged discussion, extending over several hours. An amendment was rejected by 22 for and 37 against, and the recommendation of the committee, that baths be erected, was affirmed.

Spontaneous Combustion in Coal-ships.—A vessel employed to take a cargo of coal from Cardiff to Valparaiso, in South-Western America, had doubled Cape Horn, when it was discovered that the cargo was on fire from spontaneous combustion, and all attempts to put out the fire were unavailing, so that the ship had to be abandoned, and the crew of about a dozen persons, with ten days' provision, in an open boat, and in almost continual rain and snow, were exposed to dreadful hardships for seventy-one days, living on shell-fish got among the rocks at and near Magellan Straits, till all died but two men and the stewardess, who were picked up by a steamer. No fewer than twenty vessels with Cardiff coal have perished from combustion of the cargo within the last few years.

Wooden Pavements.—The City Commissioners of Sewers, London, having requested information as to the experience of the Commissioner of Public Works at New York in reference to wooden street pavement, have received a friendly reply, to the effect that the experience of the authorities at New work is altogether unfavourable to it, by comparison with stone pavements, but about equal to concrete pavements. The Commissioner states that wooden pavements are especially objectionable when the ground is damp, subjecting them to rapid decay. Their average duration he estimates at five years at the most, and notwithstanding all endeavours by means of gas-tar and corrosive sublimate, to render them more enduring.

Accidents.—A large fire has occurred in King's-road, Chelsea, at the floor-cloth manufactory of Messrs. Downings & Co. The premises, which were of great extent, consisted of show-rooms, manufactory, drying-rooms, preparing-rooms, and printing-rooms. In a quarter of an hour the roof fell in, and in about twenty minutes the whole was a mass of ruins. The loss is stated to amount to over 50,000*l.*, which is covered by insurance in the Sun and other fire offices. Surrounding buildings sustained damage.——The iron roof in course of erection over the new platform of the College-street Station of the North British Railway, Glasgow, has given way, and four ironworkers were buried in the ruins. Four men were very much injured.

The Talbot Hotel, Bristol.—This ancient hostelry and posting-house, a portion of which had to be pulled down in the course of the extensive alterations set on foot by the Streets Improvement Committee, is now assuming a bolder prominence than ever, with its lofty façade sweeping round from Bath-street into Victoria-street, and a continued run of 180 ft. of frontage. The architect is Mr. John Bevan. A lofty Italian façade now forms the corner of Bath-street and Victoria-street, and the enlarged structure rapidly approaches completion. The hotel, which is being built by Messrs. Church & Phillips, for Mr. T. C. Stock, will be furnished with billiard-rooms and smoking-rooms, and there will be forty bedrooms, with bathrooms, &c.

Proposed Restoration of St. Nicholas's, Carrickfergus.—A report to the Bishop of Down, Connor, and Dromore, by Mr. Thomas Drew, R.H.A., the diocesan architect, has been issued in a printed form (Dublin: Ponsonby), with illustrations, showing an interior view with the existing clustered columns; a plan as the church is supposed to have existed in the fourteenth century; one exhibiting it as at present; and a third pointing out how the architect conceives that any future restoration should be undertaken.

Newbury New Cattle Market. — An endeavour was recently made to diminish the cost of this new market by omitting the centre pens, whereby it was conceived a saving of 400*l.* or 500*l.* would be effected. It was found, however, that while the amended plan had become a skeleton in appearance, the saving in cost would only be 239*l.* It has been resolved, therefore, to abide by the plan as proposed without the alteration.

Japanese Statue and Temple Model for the Vienna Exhibition.—A statue of Buddha, 50 ft. high, copied from a bronze statue made 600 years ago, has just arrived at Vienna, for the Exhibition, from Japan. The old Japanese State religion will be represented by the model of a Sinto temple.

Land in the City.—Premises in Coleman-street (once a leading thoroughfare of the City, but since the opening of Moorgate-street not so much used), with an area of about 2,000 ft., have been sold at the Mart by Messrs. Edwin Fox & Bousfield, for the sum of 12,000*l.*, being at the rate of 6*l.* per foot.

TENDERS

For the erection of two shops, Cricklade-street, Swindon, Wilts. Mr. W. H. Read, architect:—

Dover	£960 0 0
Hurst	945 0 0
Barrett	890 10 0
Sheppard & Co.	850 0 0
Phillips	838 0 0
Wiltshire	825 0 0
Forshaw	764 11 0

For alterations and additions to the Dunstable Town-hall and new Plait-hall in the rear, for the corporation of the borough of Dunstable. Mr. H. Elliott, architect:—

	Front in Cement.	Front in Bath Stone.
Cheshire	—	£1,241 0 0
Robinson	£1,189 0 0	1,239 0 0
Gilmour	997 0 0	1,060 0 0
Higgs*	975 0 0	1,015 0 0

* Accepted for Bath stone.

For alterations, additions, and repairs to a warehouse and offices, Upper Thames-street, City. Mr. Herbert Ford, architect:—

Henshaw & Co.	£4,308 0 0
Higgs	3,703 0 0
Adamson & Sons (accepted)	3,267 0 0

For water-pipes, &c., borough of Maidenhead:—

Quartermain	£260 0 0
Bloomfield	230 0 0
Jones & Sons	220 0 0
Painter	206 10 0
Rogers	175 0 0
Duffield	169 18 0
May (accepted)	155 0 0

For mortuary-hall, lodge, priest's house, and dead-house, at the Jews' Cemetery, Willesden. Mr. N. S. Joseph, architect. Quantities by Mr. T. T. Green:—

Henshaw & Co.	£3,773 0 0
Browne & Robinson	3,722 0 0
Nightingale	3,675 0 0
Dove, Bros.	3,615 0 0
Perry, Bros.	3,612 0 0
Langmead & Way	3,570 0 0
Scrivener & White	3,546 0 0
Manley & Rogers	3,530 0 0
Adamson & Son	3,519 0 0
Newman & Mann	3,436 0 0

For the erection of a cottage, in the Broadway Ramsgate, for Mr. J. F. Le Mair. Mr. John R. Collett, architect:—

Keel (accepted)	£387 0 0

For portion of new premises, for Messrs. Cox & Sons, church furniture manufacturers, Southampton-street, Strand. Mr. S. J. Nicholl, architect. Quantities taken out by Messrs. Stoner & Ashby:—

Kilby	£2,442 0 0
Colls & Son (too late)	2,355 0 0
Thompson	2,345 0 0
Hart	2,345 0 0
Simpson & Sons	2,300 0 0
Howard (accepted)	2,297 0 0

For new relieving-offices, and alterations to present receiving-wards, at Kensington Workhouse, for the Guardians of the Poor of the pairsh of St. Mary Abbotts, Kensington. Mr. A. Williams, architect. Quantities by Messrs. Lansdown & Pollard:—

Selway	£6,020 0 0
Chamberlain, Bros.	5,190 0 0
Benstead & Sons	5,215 0 0
Scrivener & White	5,065 0 0
Hockley	5,018 0 0
Stoner	5,065 0 0
Stimpson & Co.	5,025 0 0
Howard	4,840 0 0
Sawyer	4,800 0 0
Cowland	4,616 0 0
Temple & Foster	4,458 0 0
Lacy	4,346 0 0
Hook	4,373 0 0
Chappell	4,331 0 0

For residence at Brittons Braunton, Devon, for Mr. John Cockburn. Mr. H. Gardiner Gribble, architect. Quantities by Mr. C. A. Gould:—

		If Portland Cement, extra.	External Painting, extra.
Hunt	£2,980 0 0	£56 10 0	£47 10 0
Hartnoll	2,904 11 8	30 0 0	38 10 0
Howard	2,670 0 0	51 10 0	42 0 0
Blackmore & Morley*	2,420 0 0	48 0 0	35 0 0

* Accepted, conditionally.

For schools and offices at Central-street, Finsbury:—

Shurmur	£6,879 0 0
Williams & Son	6,680 0 0
Axford	6,495 0 0
Dove, Brothers	6,495 0 0
Grover	6,490 0 0
Langmead & Way	6,490 0 0
Scrivener & White	6,485 0 0
Browne & Robinson	6,475 0 0
Henshaw	6,343 0 0
Niblett & Son	6,340 0 0
Pritchard	5,919 0 0

For concrete foundation, Board Offices for the London School Board:—

Webster	£2,285 0 0
Brass	1,998 0 0
Macey	1,927 0 0
Dove, Brothers	1,575 0 0